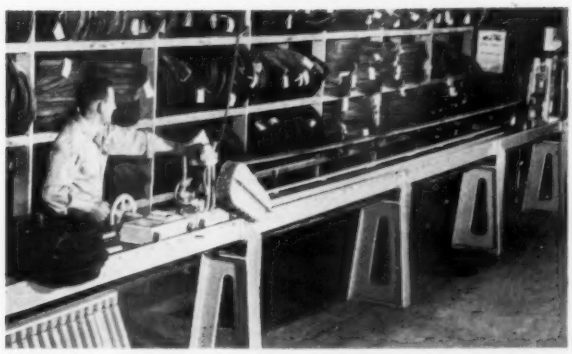
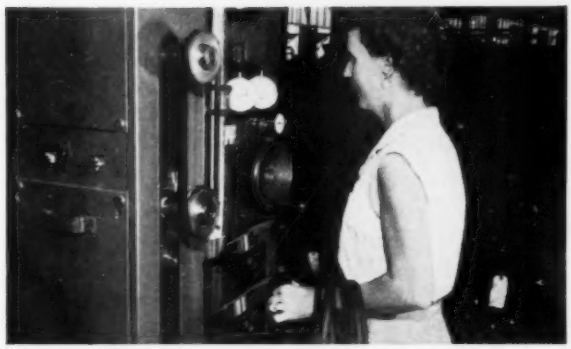
Only V-Belts with the Green Seal give you





Precise measurement of every Goodyear V-Belt and coding to unusually fine tolerances prepare the way for more exact matching of sets—at factory, warehouse, or by distributors. The built-in quality of Dimensional Stability assures that belts stay matched, for life.

dimensional stability – Unsurpassed steel cables or exclusive Triple-Tempered (3-T) Cords provide true dimensional stability from factory to drive.

– that assures you of –

matched sets that stay matched – Sets of belts are matched to the closest standards. And they stay matched under all conditions of storage.

minimum stretch on the drives – Belts on multiple drives work as a team. You eliminate "loafers" – or overworking any of the belts.

– and you also get –

high modulus – You get the greatest possible resistance to shock-loads. You're protected from power loss due to "creep."

friction balance – Covers have the ideal coefficient of friction. No sticking or grabbing in the grooves. And no dusting.

mildew immunity – You're safe from the effects of moisture – in use or in storage. Stand-by belts are always ready for use – no matter how long you keep them.

– and all that pays off in –

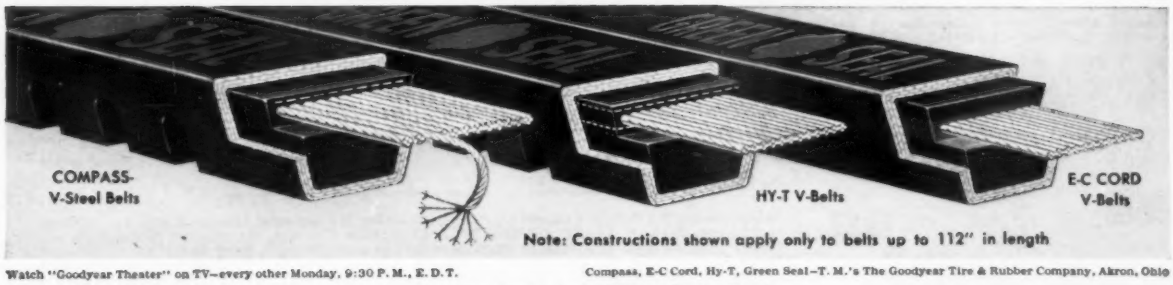
–maximum, trouble-free horsepower hours–at minimum cost – on any and every drive in your plant. It's easy to see why you should see your Goodyear Distributor for details. Or write to Goodyear, Industrial Products Division, Lincoln 2, Nebraska, or Akron 16, Ohio.

DIMENSIONALLY STABLE V-BELTS with the GREEN SEAL by

GOODYEAR

60 GOODYEAR ANNIVERSARY

THE GREATEST NAME IN RUBBER



Note: Constructions shown apply only to belts up to 112" in length

Watch "Goodyear Theater" on TV—every other Monday, 9:30 P. M., E. D. T.

Compass, E-C Cord, Hy-T, Green Seal–T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

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'ROUND ABOUT

with the editors in field and office

Edited by R. L. Marinello

Goodreau Named Plant Engineer

D. J. Goodreau was appointed plant engineer of Adams Engineering Co., Inc., Miami, Florida. He will be in charge of supervision of all plant services and equipment, including construction, installation, repair and maintenance of all machinery and equipment plus maintenance of grounds, buildings and fire equipment.

He previously was chief engineer with the Plymouth Cordage Co., Plymouth, Mass., and plant and inspection engineer for Bethlehem Steel Co., at a 240-acre shipyard at Hingham, Mass.

He joined the company in 1956 and holds diplomas in mechanical, steam power and electrical engineering and attended New Bedford and New England Technical Institutes.

Course on Electric Lamps

IF ANY OF your men need a refresher on the principles, characteristics and applications of incandescent, fluorescent and mercury vapor lamps, they will be interested in the home study course being offered by Sylvania.

The course consists of eight lesson assignments, covering types of lamps, effects of voltage variations, group replacement, starting methods and ballasts, ambient temperature, and many others.

For further information about this course, address your inquiry to David C. Lash, Jr., Sylvania Electric Products, Inc., 60 Boston St., Salem, Mass.

Radioisotope Course

INDUSTRIAL PLANTS now using or planning to use radioisotopes in their work will be interested in the radioisotopes techniques course which will be presented by the special training division of the Oak Ridge Institute of Nuclear Studies.

Initially, two courses have been scheduled—the first to begin on February 9, and the second to start on April 6.

The new Oak Ridge course will consist of lectures, seminars, demonstrations and laboratory sessions. The work will emphasize practical plant applications of radioisotopes, including standard techniques of wear measurement, thickness measurements and radiography, in addition to other techniques applicable to industrial operations.

For further information, send your inquiry to Oak Ridge Institute of Nuclear Studies, United States Atomic Energy Commission, Oak Ridge, Tennessee.

New Appointment at Avisco

William W. Via has been appointed assistant maintenance foreman, Electrical Division of American Viscose Corporation, Fredericksburg, Va. He was formerly assistant power engineer at the company's Roanoke, Va., plant.

A native of Calloway, Va., he has been with the company for 35 years. He came with the company in 1923 at Roanoke as a utility worker in the Reeling Department and later gained extensive experience as an electrician. In 1951 he was named assistant electrical foreman.

Standards Manual on Drafting

THE SEVENTH section of the American Drafting Standards Manual has just been approved by the American Standards Association and published by the American Society of Mechanical Engineers.

Section 7, designated ASA Y14.7-1958, covers gears, splines and serrations. Its purpose is to show satisfactory methods for detailing gears, particularly teeth. It defines the basic minimum drawing information for the manufacture and inspection of gears, and indicates optional information frequently required for a more specific definition of process control or product quality.

This drafting standard manual, price $1.50, along with the six other sections already published may be obtained by placing your order with

Subscriptions: U.S.A. $10, Canada $11. Other countries $12 per year. Single copies $1. Change of address: Send to PLANT ENGINEERING, Circulation Division, Barrington, Illinois. Please supply position title, company name, company address. Request must reach us by 15th of month to make the change effective with following month's issue. Published monthly and accepted as controlled circulation publication at Chicago, Ill.

4 NEW TIMESAVING TOOLS from Graybar

FOR ELECTRICAL CONSTRUCTION AND MAINTENANCE

NEW—Super Portable
WELLS 49A
METAL CUTTING BAND SAW

Rigged with handle and ball bearing wheels, this new Wells 49A metal cutting band saw does double duty in the shop and on the job. As a horizontal cut-off tool it has a capacity of 3½" x 6". Swing the head and it becomes a vertical band saw. Call Graybar for details.

NEW Light weight, speedy
CONDUMATIC BENDER

This new Condumatic motor driven conduit bender is powerful enough to handle rigid heavy wall conduit in sizes of ½", ¾" and 1". It's light enough to make it easy to move from job to job, or deck to deck. Makes 90° bends, offsets and doglegs right up close to the elbow. Ask Graybar for literature.

NEW—Back saving
ALLEN ELEVATING SCAFFOLD

Make a crew out of one electrician with the new Allen Elevating Scaffold. Working platform regulates in heights of 4" and jacking device raises and holds heavy fixtures in place until securely fastened. Makes fixture hanging a fast, precise mechanical operation. Also, excellent for use in installing electrical duct or conduit systems. Have Graybar rush facts to you.

NEW—Shoot lines through conduit with **JET LINE GUN**—With the new Jet Line Gun you can shoot a line through conduit runs up to 250 feet, in seconds. Just load the Jet Line Gun with a CO_2 cartridge, line attached. Fire gun into conduit. Cartridge become projectile. Cartridge and line pop out open end of conduit. Pull heavier line in, then pull in wire. Call Graybar for demonstration.

Write for literature on all these new 1958 helps for electrical construction. They're typical of new electrical equipment you can expect from Graybar. If it's new, if it's extra good, if it's built by one of the country's leaders, Graybar has it for you. For immediate action—

85

CALL **GraybaR** FIRST FOR . . .

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QUALITY SINCE 1869 *REG. U.S. PAT. OFF.

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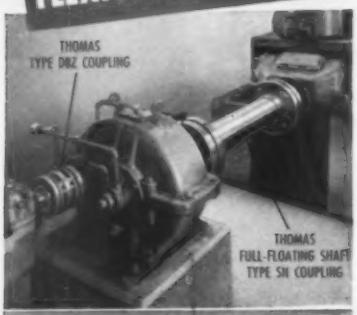
PROTECT Your Machinery with
THOMAS
ALL METAL
FLEXIBLE COUPLINGS



NO LUBRICATION
NO MAINTENANCE
NO WEARING PARTS

Future maintenance costs and shutdowns are eliminated when you install Thomas Flexible Couplings. These all-metal couplings are open for inspection while running.
They will protect your equipment and extend the life of your machines.
Properly installed and operated within rated conditions, Thomas Flexible Couplings should last a lifetime.

UNDER LOAD and MISALIGNMENT ONLY THOMAS FLEXIBLE COUPLINGS OFFER ALL THESE ADVANTAGES.

1 Freedom from Backlash Torsional Rigidity
2 Free End Float
3 Smooth Continuous Drive with Constant Rotational Velocity
4 Visual Inspection While in Operation
5 Original Balance for Life
6 No Lubrication
7 No Wearing Parts
8 No Maintenance

Write for Engineering Catalog

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA, U.S.A.

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'ROUND ABOUT

the American Standards Association, 70 E. 45th St., New York 17, N. Y., or from The American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N. Y. The other sections cover: Size and Format; Line Conventions, Sectioning, and Lettering; Projections; Pictorial Drawings; Dimensioning and Notes; and Screw Threads.

New Plant Engineer

Walter P. Stroud was recently appointed plant engineer for the American Viscose Corporation, Film Division, Marcus Hook cellophane plant.

Prior to joining the company, he was an engineer with Rust Engineering Company, Phillips Petroleum and Blaw-Knox Company. He is a graduate of the University of Arkansas with a degree in chemical engineering.

Paints and Coatings Meeting

NEW DEVELOPMENTS in all types of paints for interior and exterior use will be explored at the Field Applied Paints and Protective Coatings Conference to be held at the Shoreham Hotel, Washington, D. C., on December 3 and 4.

Main objective of the meeting will be to define the advantages and limitations of the many new oils, pigments, solvents and other types of materials used in today's paints and coatings.

Among the points of major interest to both the building and paint industry will be a discussion of factors influencing deterioration of paints—interior and exterior; future developments in paints and coatings; and analyzing high humidity, high temperature and severe chemical exposure applications.

Requests for further information, final program and registration material should be sent to Harold Horowitz, BRI Technical Secretary, 2101 Constitution Ave., Washington 25, District of Columbia.

Expansion Joint Standard

MEMBERS OF THE Expansion Joint Manufacturers Association have just published the first edition of a standard on expansion joints.

The purpose is to set forth recommended standards, consistent with safety and service conditions, for mechanical design and application of various types of metallic packless joints. The standard is primarily concerned with pointing out the factors that must be considered in designing a piping system that contains expansion joints.

Copies of this standard are available at $1.00 per copy from the Expansion Joint Manufacturers Association, 53 Park Place, New York 7, New York.

Overhead Heating Clinic

VARIOUS METHODS and techniques for installing overhead furnaces are pointed out in relation to the structural conditions of the building in a one-day Field Installation Clinic.

In addition, a thorough demonstration of how to balance the job for maximum efficiency of operation and proper distribution of heat are discussed.

Afternoon discussion period covers proper installation procedures, controlling draft and combustion, heat distribution and cold air return, the function and coordination of various controls, as well as simplified service techniques and a check-list of practical preventive maintenance suggestions.

Further information about this one-day clinic and necessary arrangements for having it conducted in your area, may be obtained by writing to OverHead Heaters, Inc., 1612 Book Bldg., Detroit 26, Mich.

Plant Engineering Promotion

H. F. Quipe has been promoted to factory manager of Penn Controls, Inc., Goshen, Indiana. He has been with the company for 19 years, having started in 1939.

In his new capacity, he will be responsible for plant engineering, which includes installation of new machines and equipment, material handling equipment and for the direction of the production units.

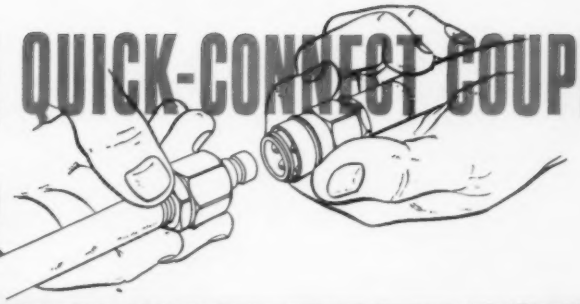
Foundry Home Study Course

FOR BEGINNERS and for engineers interested in a refresher, the Metals Engineering Institute is offering a home study course entitled "Gray Iron Foundry Practice."

The course covers present-day casting processes in 15 authoritative lessons. Patterns, cores, sands, melting practice, cleaning, inspection and control are discussed fully. Also included are lessons dealing with the metallurgy of casting.

Additional information may be obtained by writing to Metals Engineering Institute, 7301R Euclid Avenue, Cleveland 3, Ohio.

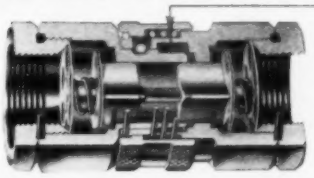
WHICH SNAP-TITE QUICK-CONNECT COUPLING IS BEST FOR YOU?



SNAP-TITE "H" COUPLING . . . . . FOR HIGH PRESSURE APPLICATIONS

FOR HYDRAULIC OR AIR

"H" Coupling for high strength, higher efficiency, high-resistance to heavy line surge. Sizes: ⅛" thru 10". Bulletin No. 240

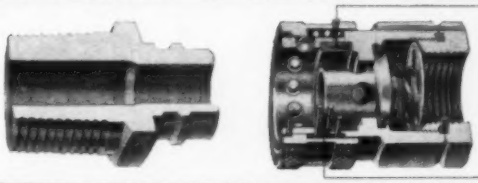


Exclusive U-packer gives a positive seal without compression set because of rubber distortion. Line pressure inside the U-packer keeps it open and forced against its metal backing—the higher the pressure, the tighter the seal.

SNAP-TITE 'IH' COUPLING . . . . . FOR IMPACT IN AIR LINES

FOR RESISTING THE IMPACT OF RECIPROCATING AIR OPERATED TOOLS

The 'IH' Coupling delivers more air to tools. Cylinder-type 'IH' valve for 360° contact. Sizes ⅛" thru ½". Bulletin No. 248.



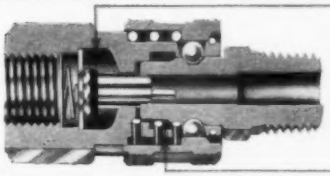
Exclusive U-Packer

360° contact

SNAP-TITE HI-FLOW COUPLING . . . FOR LOW PRESSURE APPLICATIONS

FOR AIR AND FLUIDS UP TO 150 p.s.i.

Hi-Flow is recommended to connect small air tools to plant air system, and for low pressure fluid transfer in small lines. Sizes: ⅛" thru ⅜" Bulletin No. 249



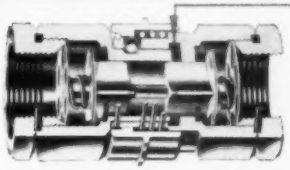
Bonded valve washer (pat. pending on valve construction)

Exclusive U-packer

SNAP-TITE "E" COUPLING . . . . . FOR VACUUM and VERY LOW PRESSURE

FOR VACUUM SYSTEMS IN THE MICRON RANGE

"E" Coupling performs in the *micron* range in the smaller sizes both connected and disconnected. Recommended, too, for gravity flow . . . U.L. approved for LP Gas. Sizes: ⅛" thru 10". Bulletin No. 250

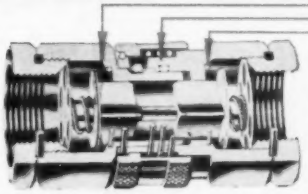


Nipple seals in coupler by depressing the lip of the E packer and slightly compressing the body of the packer. This new E-packer gives positive seal under high-pressure, low-pressure, and vacuum.

SNAP-TITE 'T' COUPLING . . . . . FOR HARD TO HANDLE FLUIDS

FOR FUMING ACIDS, ALKALIES, SOLVENTS . . .

'T' is the only coupling now on the market for fluid temperatures from −40°F to +400°F. Its seals are made of Teflon for which there is no known solvent. Sizes: ½" thru 3". Bulletin No. 270.



Teflon Valve Seal

Teflon Nipple Seal

Teflon Valve Seal

Snap-Tite Couplings are available plain, (without valves), and with either single or double shut-off. Couplings normally furnished in alloy steel, but all (except hi-flow) are also available in brass, aluminum, or stainless steel with a variety of finishes.

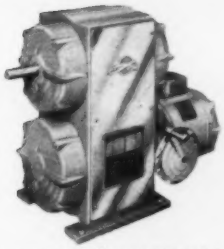
★ Snap-tite

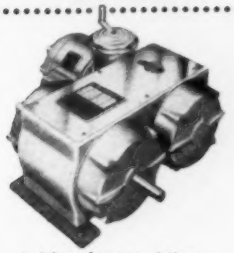
SNAP-TITE COUPLINGS CAN HANDLE ALMOST ANYTHING THAT FLOWS

SNAP-TITE, INC., UNION CITY 5, PA.

For more facts circle 505 on Reply Card

Conduit box can be located top, bottom, or either side.
Control hand wheel can be positioned on top or either side.
All end-bracket assemblies are interchangeable for repositioning of drive components.
Motor can be mounted top or bottom.
ALLISPEDE
MECHANICAL ADJUSTABLE SPEED DRIVE
THE LOUIS ALLIS CO.
GET ALL THESE VARIATIONS
FROM ONE BASIC DESIGN
—with wrench and screwdriver!





Just two of many variations that can be made from a standard ALLISPEDE DRIVE.

Another NEW product from Louis Allis

The ALLISPEDE* DRIVE gives you complete field versatility!

It's the most flexible and precise mechanical adjustable speed drive made–and the only one that can be fully adapted in the field!

The *all-new* ALLISPEDE DRIVE is the answer to any motor application that calls for low-cost adjustable speed. It permits smooth, easy speed adjustment — and maintains it exactly. Its modern design permits unusual field-flexibility — lets the user change the unit *any time* to suit his various requirements.

Output shaft can be high or low, right or left.

The a-c ALLISPEDE DRIVE is the *only* drive that can be fully adapted in the field by the user. The basic unit goes together like building blocks . . . feet, end brackets, control hand wheel, conduit box, and output shaft can be relocated in minutes to fit existing space limitations. The same unit can be changed from an upright to a horizontal drive for floor, wall or ceiling mounting. And all you need is a wrench and screwdriver!

Superior design improves drive efficiency and extends service life. The four bearings equally distribute belt load, increasing bearing and belt life. Movable discs slide smoothly on internally-lubricated splined shafts—won't stick in place or wear.

Detachable feet can be bolted to bottom, side, or top for floor, wall, or ceiling mounting.

Rugged cast-iron housing with plated steel covers shields drive against dirt and corrosion . . . integral rotor fan cools the motor and force-ventilates the drive housing to extend bearing life. Oversize cartridge bearings are pressed on shaft and lubricated at the factory. Corrosion-resistant stainless steel nameplates diagram proper motor connection, specify bearing sizes, and carry complete instructions for operation and lubrication.

The ALLISPEDE DRIVE can be supplied with in-line or right-angle integral gears, brake and tachometer. Sizes from 1 to 20 HP with speed variations up to 8:1. Electrical and mechanical modifications for any application.

Contact your Louis Allis District Office or Distributor for complete information and engineering assistance. Or write for Bulletin 3300, The Louis Allis Co., 434 East Stewart Street, Milwaukee 1, Wisconsin.

**ALLISPEDE is a trademark of The Louis Allis Co.*

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

LOUIS ALLIS

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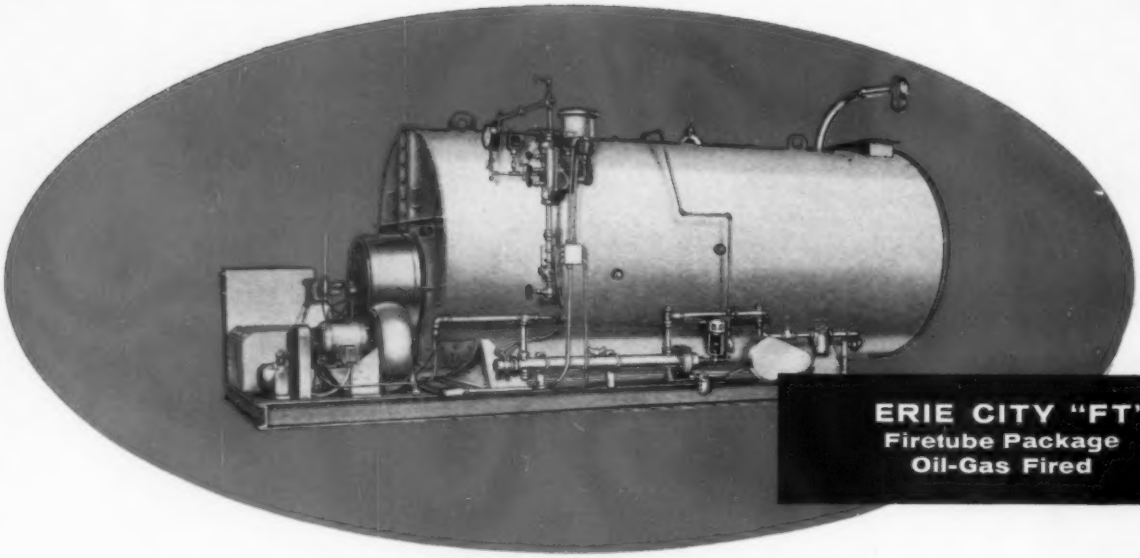
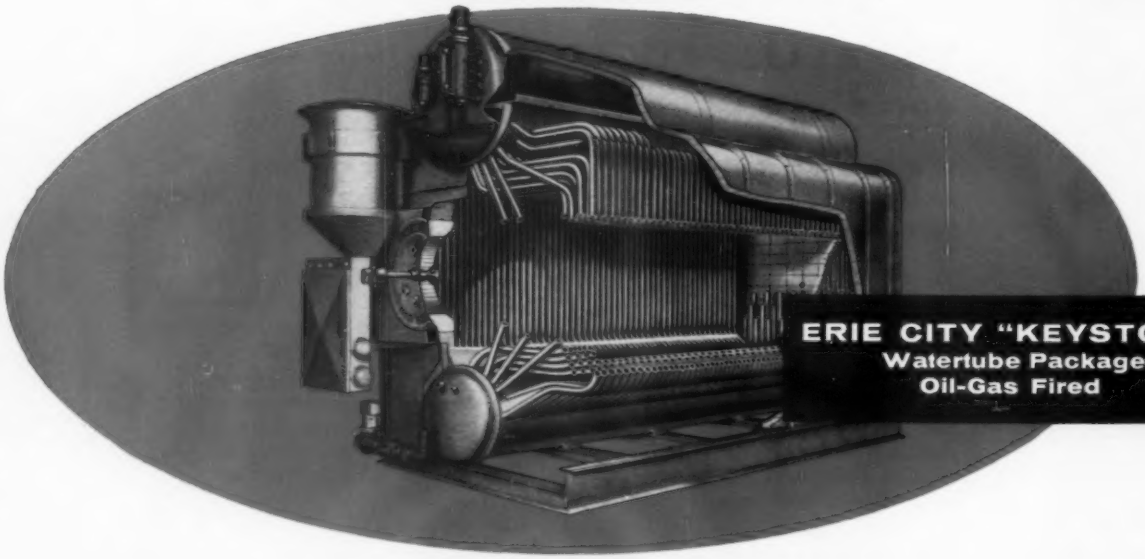
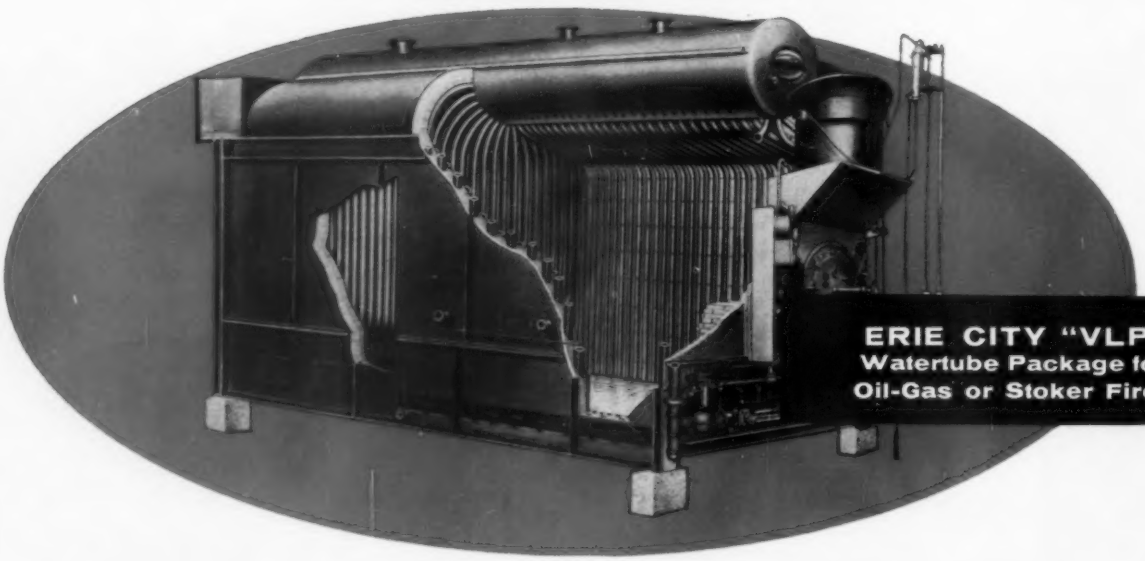
ASD-121



ERIE CITY "FT"
Firetube Package
Oil-Gas Fired



ERIE CITY "KEYSTONE"
Watertube Package
Oil-Gas Fired



ERIE CITY "VLP"
Watertube Package for
Oil-Gas or Stoker Fired

Why shop around for Package Boilers?

Thinking about a new boiler these days? Maybe a package boiler! Sounds like a good idea because many people like this new concept of undivided responsibility. But what kind should we get? Firetube? . . . Watertube? Should it be oil fired, gas fired, arranged for future stoker firing; or which combination of these would be best for us?

The best place to find unbiased answers to your questions is Erie City Iron Works—a pioneer in the boiler industry and a leader in the package steam generator field. Erie City manufactures both firetube and watertube package units. Without prejudice their engineers can point out the advantages of both types.

After hearing the pros and cons of each, you may decide on the firetube type. Erie City offers its modern "FT" Package Boiler arranged with Erie City air atomizing oil gun and/or ring type gas burner. The "FT" Fire Tube Package unit is built to highest quality standards—not down to a price. It is a three pass design with gas vent at the rear and pressurized, using forced draft to provide precise control of excess air and CO_2. A centrifugal fan is used, which coupled to a closed combustion chamber, results in unusually quiet operation. No costly foundation—no expensive stack—no brickwork are required.

"FT" Cat. SB5683L

If a watertube boiler is your choice, you have two types available from Erie City. One is the KEYSTONE, the most compact water tube package available, arranged with a steam atomizing oil gun and/or ring type gas burner. The KEYSTONE is a baffleless, two drum unit completely water cooled with a seal welded inner casing and bolted outer casing for pressurized operation. No costly foundation—no expensive stack—no brickwork are required.

The other choice for a watertube package is the VLP. Your plant may be located in an area where gas, oil and coal are all available. At first you may decide to fire with oil or gas but desire the proper provision for future coal firing. The boiler for you to install is an Erie City VLP arranged for present oil and gas firing but with the furnace PROPERLY PROPORTIONED for the future installation of an underfeed or spreader stoker.

"Keystone" Cat. SB983L

All Erie City package units come complete with burners, fans and safety and combustion controls, piped, wired and mounted on the boiler. No field work required—just make basic fuel, water, steam and electric connections and you're ready for operation.

Both the air atomizing and steam atomizing burners are of Erie City's own design and manufacture. No division of responsibility here. Qualified service engineers will assist at start up and instruct your operating personnel. In the case of the VLP, your boiler will be properly designed for future conversion to either Erie City underfeed or spreader stoker firing. Again, no division of responsibility.

Don't let the selection of a new boiler become an unnecessary problem. Write and let Erie City help make the proper selection of a package steam generator for you.

"VLP" Cat. SB5783L

• *You can depend on* ERIE CITY Since 1840 *for sound engineering*

ERIE CITY IRON WORKS *Erie, Pennsylvania*

STEAM GENERATORS • SUPERHEATERS • ECONOMIZERS • AIR PREHEATERS • WASTE HEAT BOILERS
FIRE and WATER TUBE PACKAGE BOILERS • OIL and GAS BURNERS • STOKERS • PULVERIZERS

For more facts circle 507 on Reply Card

THERE'S A PERMATEX SEALANT WITH THE PROPERTIES YOU NEED

Hold it! Hold *any* liquid or chemical . . . with sealants by Permatex–who makes FORM-A-GASKET Numbers 1, 2 and 3–the most famous name in leak-proofing for industry.

The sealants below are *special* . . . the result of laboratory cooperation with Industry. They find use where other sealants can't fill the bill! *Remember*, no liquid or chemical is too special for Permatex . . . and we'll help you with your specific sealing problems on request.

Protect your investment in time and labor when putting in or repairing any fluid system . . . seal with the best . . . Permatex.

SEALANT	FORM	SETS	TEMP. RANGE	FEATURES
Sealant 1282	Brushable black paste. Soluble in water.	Hard	Minus 50°F. to plus 600°F.	For "hard to hold" chemicals. Insoluble in most chemicals used in industry today. Specially resistant to non-flammable hydraulic fluids of the phosphate and silicant ester types. Excellent for use on all types of industrial refrigerants.
Sealant 1372	Black paste. Soluble in alcohol.	Semi-rigid	Minus 50°F. to plus 650°F.	High temperature resistance. Used by leading aviation heating equipment manufacturers to seal heating ducts because it does not produce offensive odors at high temperatures and is vibration and diester resistant.
Sealant 1505	White paste or brushable liquid form (1520). Soluble in alcohol.	Semi-rigid	Minus 60°F. to plus 375°F.	Can be key colored. Resistant to aliphatic hydrocarbons such as gasoline, hexane, pentane, etc.; aromatic hydrocarbons such as benzene, toluene, etc.
Sealant 1516	Black paste. Soluble in perchlorethylene.	Remains pliable.	Minus 65°F. to plus 200°F.	Formulated specially for oxygen assemblies. Meets all safety requirements for threaded, flat or flanged assemblies. Good vibration resistance.
Sealant 1519	Black, brushable paste. Soluble in toluene.	Dries to pliable film.	Minus 50°F. to plus 230°F.	Acid, alkali resistant. Resists hot or cold acid, alkali and salt solutions, as well as lower molecular weight alcohols and glycols.
Sealant 572	Tan, brushable viscous liquid.	Slowly, forming a flexible plastic film.	Minus 65°F. to plus 400°F.	Hydrocarbon resistant. Conforms to MIL-S-7916B. Exceptionally resistant to vibration. Highly recommended for aromatic fuels and lubricants in aviation industry.

Plus complete lines of job-tailored products to keep your equipment producing faster, more safely, with less downtime. All are available at recognized quality industrial distributors.

PERMATEX

PERMATEX

COMPANY, INCORPORATED
300 Broadway, Huntington Station, L. I., New York
Factories: Brooklyn, N. Y. • Kansas City, Kansas
SEALANTS • ADHESIVES • LUBRICANTS

For more facts circle 508 on Reply Card

For more facts circle 509 on Reply Card ⟶

You find Gates Hose where anything flows

Mackinac Bridge, world's longest suspension bridge, connects upper and lower peninsulas of Michigan. Because reliability of equipment is an important factor in the grouting operations, Gates Water and Air Hoses were used.

PHOTOS COURTESY MACKINAC BRIDGE AUTHORITY

Gates Air Hose helps build bridge "that couldn't be built"

TPA 304

Industry everywhere depends upon Gates Industrial Hose to provide air, water, steam, oil and suction for every type of application, including some of the toughest jobs in the world.

Actually there are *tens of thousands of miles* of Gates Hose in daily use — every type and size from air hose the diameter of a pencil to petroleum hose as big as the mains in city streets.

Back of the world-wide acceptance of Gates Hose is a continuing program of *specialized* hose research at the multi-million dollar Gates Research Center staffed by more than 200 chemists, physicists, engineers and technicians.

It is the aim of this *specialized* research to increase hose utility and life, and to lower industry's annual hose costs.

Because Gates Hose is so widely preferred, it is quickly available from leading distributors in all industrial centers in the United States and in 90 countries throughout the world . . . and its outstanding performance is guaranteed by the *World's Largest Maker of V-Belts.*

Gates 18HB Air Hose, with oil resistant tube and abrasion resistant cover, gives exceptional performance on all heavy duty air usage. This popular hose — one of many in Gates full line — is always available from your nearby Gates Distributor.

The Mark of Specialized Research

Gates

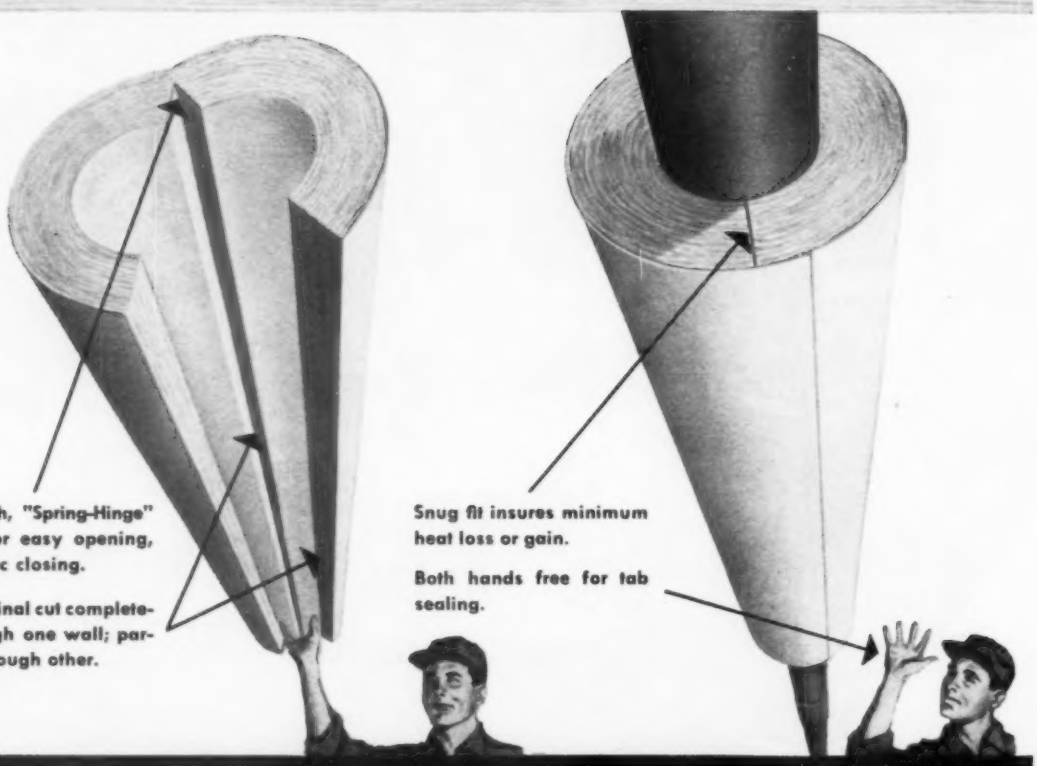
The Gates Rubber Company • Denver, Colorado

Gates Industrial Hose

Made in a Full Range of Types and Sizes

MICRO · LoK

PIPE INSULATION*



Full-length, "Spring-Hinge" action for easy opening, automatic closing.

Longitudinal cut completely through one wall; partially through other.

Snug fit insures minimum heat loss or gain.

Both hands free for tab sealing.

HERE'S A "BIRD'S-EYE" VIEW OF MICRO·LoK:

"Spring-Hinge" Action

One-piece construction and automatic closing feature introduces new savings in application costs; increases efficiency of workers by quickly freeing hands for sealing tabs and other operations.

Light in Weight

Three foot section of 1" thick MICRO•LoK for fitting 2" pipe weighs ¼ lb. L.F.—only ⅛th the weight of insulations which require more thickness to do the same job.

Excellent Thermal Performance

Made of finer, longer fibers, it has efficiency equal to or better than commonly used insulations. Temperature limit is 350° F.—unaffected by sub-freezing temperatures.

*PATENTS APPLIED FOR

©1958 L·O·F Glass Fibers Company

Look to L·O·F Glass Fibers for the NEW things in fiber glass

Another first from L·O·F Glass Fibers Company

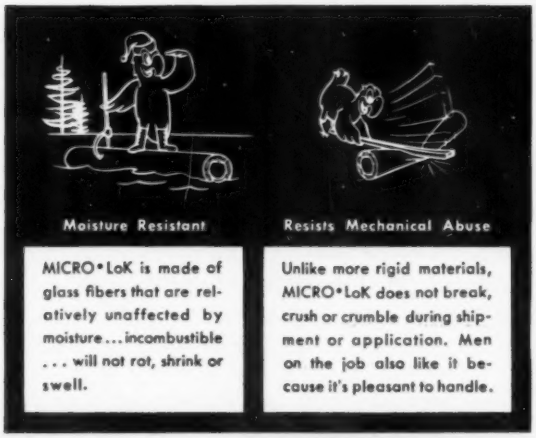
for better performance and faster application

featuring full-length, "Spring-Hinge" action

1. The *first* one-piece, full-length "Spring-Hinge" action for easy opening and automatic closing.

2. The *first* fiber glass pipe insulation that permits easy cutting and fitting of the inside diameter around couplings, unions, pipe hangers and other irregularities.

The L·O·F Glass Fibers' process permits production of all standard wall thicknesses —especially ½" and ¾" walls—for all pipe and copper tubing sizes.


Moisture Resistant
MICRO•LoK is made of glass fibers that are relatively unaffected by moisture... incombustible ... will not rot, shrink or swell.
Resists Mechanical Abuse
Unlike more rigid materials, MICRO•LoK does not break, crush or crumble during shipment or application. Men on the job also like it because it's pleasant to handle.

OPENS EASILY—CLOSES AUTOMATICALLY

EASY FITTING TO IRREGULAR PLACES

FASTER APPLICATION AT LOWER COST

RESISTS BREAKAGE AND CRUMBLING

SUPERIOR THERMAL EFFICIENCY

MICRO·LoK Pipe Insulation is available in factory applied jackets—including canvas, vapor barriers, flame resistant—for all operating conditions, whether hot or cold, concealed or exposed, indoor or outdoor.

For more information on sizes, recommended thicknesses and application, *write: L·O·F Glass Fibers Company, Dept. 67-118, 1810 Madison Avenue, Toledo 1, Ohio.*

L·O·F GLASS FIBERS

L·O·F GLASS FIBERS COMPANY

TOLEDO 1, OHIO

For more facts circle 510 on Reply Card

When a motor we installed single phased, — Fusetron Fuses saved our reputation and a $200 rewind job

C. B. Meldrum, OWNER
MELDRUM ELECTRIC COMPANY
HOUSTON, TEXAS

Mr. Meldrum continues:

"Recently I sent several of my men to install a 50 h. p. air conditioning unit for a customer.

"It seems that my man who wired the 200 amp. switch failed to tighten a lug. He just hung the wire on the lug and then forgot to tighten it.

"When the unit was started, it didn't take long for trouble to develop. The loose connection caused one Fusetron fuse to blow. The motor started to run single phased but before any damage could result the other Fusetron fuses protecting the motor also blew and shut down the motor.

"My company stands behind its work. If the motor would have burned up, we would have rewound it without question. I know this would have cost us at least $200.

"What is important too, our reputation was saved and we have a satisfied customer. If the Fusetron fuses had not given us an opportunity to go back and do the job right before the motor was damaged, we would have been in a 'hot' spot."

For safe, modern, money-saving protection install FUSETRON dual-element FUSES and BUSS Hi-Cap FUSES throughout entire Electrical System!

Why Fusetron Fuses Provide Safest, Simplest Way to Prevent Damage from Single Phasing

When single phasing occurs, the current in the remaining phase increases about 100%. (Theoretically 73% but change in efficiency and power factor makes it about 100%.

This 100% overload on Fusetron fuses of motor-running protection size opens them and shuts down the motor.

Such dependable protection against motor burnouts from single phasing has never before been available.

You too, Can Get Safer, More Dependable and Money-Saving Protection with Fusetron Fuses

FUSETRON dual-element fuses provide 10 point protection against electrical troubles. This is unlike circuit breakers or ordinary fuses which, except in rare cases, protect only against short-circuits.

In Addition: Fusetron Fuses Require No Maintenance or Recalibration

They are calibrated at the factory by engineers. Once properly installed, they require no inspection or down-time necessary on mechanically operated devices. There are no hinges, pivots or contacts to stick or get out of order. Dust, corrosion or oxidation cannot increase a Fusetron fuse's capacity or lengthen its blowing time.

After years of inactivity, a Fusetron fuse will give the same safe, dependable protection if called upon to open as it would have on the day it was installed.

For Loads above 600 and up to 5,000 amps . . . Use BUSS Hi-Cap Fuses

They have an interrupting capacity sufficient to handle any fault current regardless of system growth.

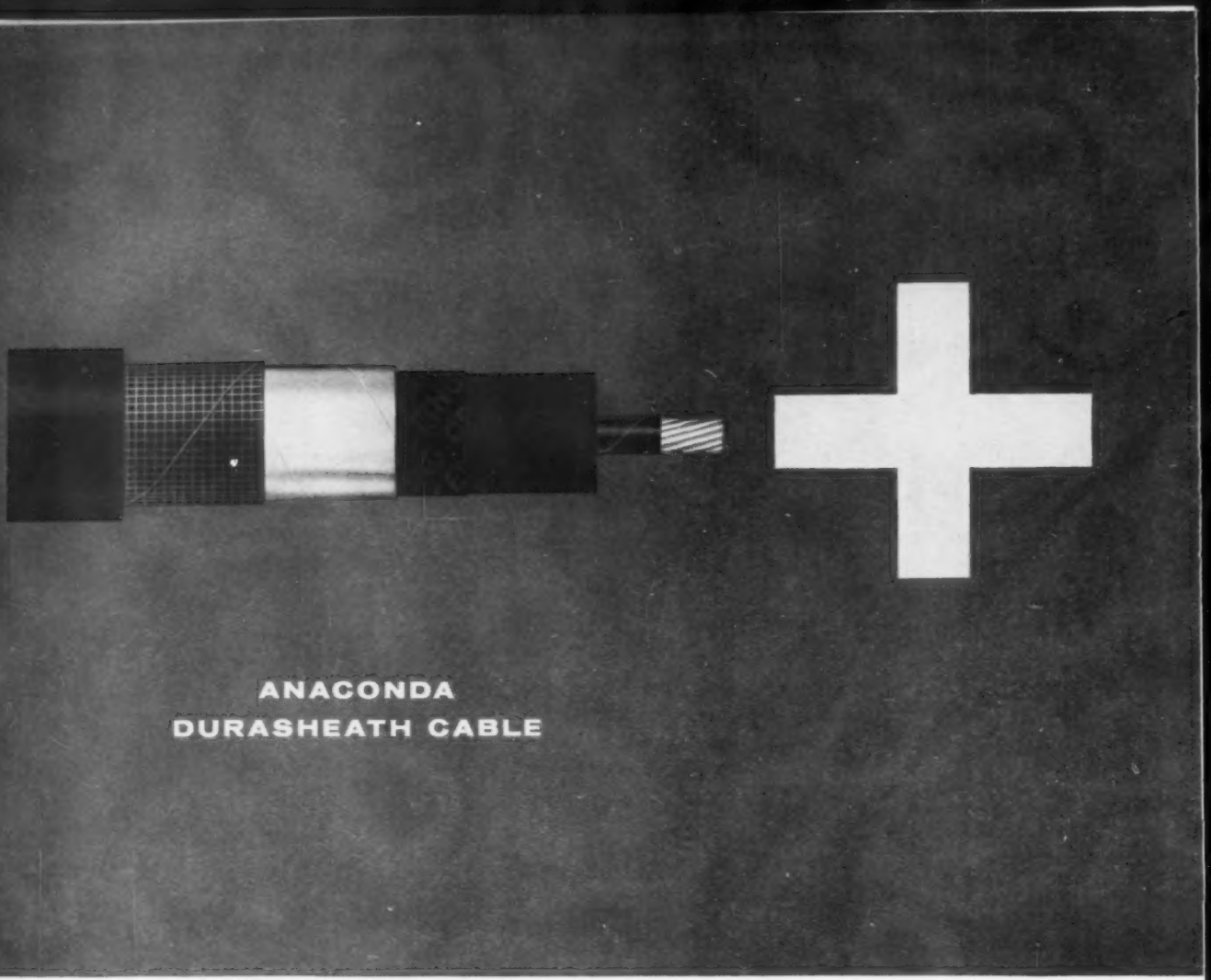
They can be coordinated with Fusetron fuses on feeder and branch circuits to limit fault outages to circuit of origin.

for more information, write for . . . **Bulletin FIS on Fusetron fuses**
Bulletin HCS on BUSS Hi-Cap fuses.

BUSSMANN MFG. DIVISION – McGraw-Edison Co. *University at Jefferson, St. Louis 7, Mo.*

FUSETRON · TRUSTWORTHY NAMES IN ELECTRICAL PROTECTION · BUSS · McGRAW EDISON · BUSSMANN MFG. DIVISION · St. Louis 7, Mo.

For more facts circle 511 on Reply Card



Anaconda Durasheath rubber-insulated, neoprene-jacketed power cable and Anaconda splicing kits were made for each other—and for you. Together, they make your wiring job easier, faster, more economical.

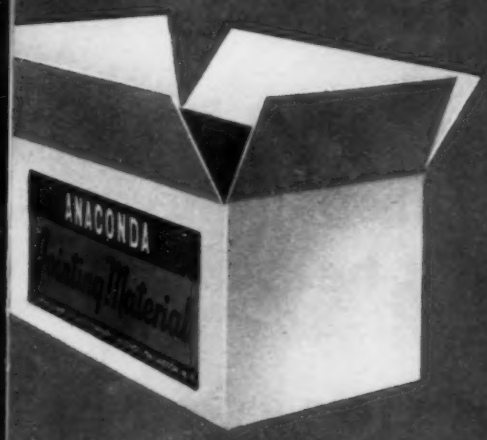
Anaconda Durasheath. First, Anaconda Durasheath* provides a superior-quality power cable with a proven record for safety, dependability, long life. Its flexibility and its versatility can effect important savings in your installed-costs budget.

A special abrasion-resistant neoprene jacket makes it possible to install Durasheath three ways: aerially, in ducts, or underground . . . in continuous runs with minimum splices. Durasheath's light weight permits use of lighter supports . . . longer spans.

Anaconda Accessories. Where splices are necessary, Anaconda Accessories – all fully engineered by cable experts – come into the picture. For in an Anaconda Jointing Kit you have every item you need for a single splicing job. No time lost assembling the necessary materials – or going back for forgotten items. The job is simplified, takes minimum time. In addition, responsibility is concentrated because your cable and your cable accessories have come from the same dependable manufacturer – Anaconda!

See the Man from Anaconda today about Durasheath power cable (5 kv., 15 kv. and higher) and Anaconda Jointing Kits. Write for Catalog C-79-13-14 on Anaconda Accessories or Catalog C-79-6 on Anaconda Rubber-Insulated Power Cable. Anaconda Wire & Cable Co., 25 Broadway, New York 4, N. Y.

*Trademark 58377 Rev.



MONEY SAVINGS
TIME SAVINGS
EASY INSTALLATION
SURE CONNECTIONS
PROVED
PERFORMANCE
CONCENTRATED
RESPONSIBILITY

ANACONDA
FULLY ENGINEERED
JOINTING KITS

ANACONDA DURASHEATH ALL-PURPOSE POWER CABLE

Available in all sizes, single and multiple conductor, copper or aluminum, 600 to 15,000 volts and higher.

Insulations: Type RHW, Anaconda ANW, AHW or AB rubber compounds, each designed for specific purposes.

Jacket: Specially compounded neoprene with high resistance to flame, oil, acids, alkalis, sunlight and ozone; has high tensile strength and flexibility! Densheath (PVC) and Polyethylene jackets are available for special applications.

An Anaconda Jointing Kit assures the right materials for the job when and where you need them. Shown above: contents of kit for 3-conductor, shielded-type rubber-insulated Durasheath cable. Similar kits also available for solid-type, varnished-cloth, thermoplastic- and paper-insulated cables.

LIVE BETTER ELECTRICALLY

SEE THE MAN FROM **ANACONDA**®

FOR **DURASHEATH AND ACCESSORIES**

For more facts circle 512 on Reply Card

BEWARE!

Don't waste money repairing old unit heaters

Replace with new units and cut maintenance costs, improve performance, avoid shutdowns

Every heating season, thousands of old unit heaters begin to fail. Frequently failure is caused by unfavorable boiler-water conditions which promote and accelerate internal corrosion. Sometimes it's due to improper venting or trapping. Often, general maintenance neglect is to blame. But even with careful maintenance, it's not uncommon for units 10 to 15 years old to begin to show signs of wear . . . lose efficiency . . . develop leaks.

One Little Leak Can Mean the Start of Skyrocketing Maintenance Costs. In *time* alone, it costs from $25 to $300 to disconnect, take down and reinstall a unit heater, depending on size, type and mounting height. Add to this the actual repairs — and the final cost is prohibitive. What's more, when a leak appears, it's almost a sure bet that the unit is weak in other places. Chances are, new leaks will develop soon — and with increasing frequency.

A Planned Replacement Program Can Avoid Costly Production Delays. Service records show that the majority of unit heater failures occur during coldest weather . . . frequently interrupt production at critical times. With a well-planned replacement program, heating failures can be anticipated. Units can be replaced in the summer months without shutdowns.

In some plants, units are *automatically scheduled for replacement* after they have been in service for a pre-determined number of years . . . usually after they have been depreciated on the company's books.

A Modine Replacement Program Offers Many Cost Advantages. In teaming with Modine to establish your own replacement program, you avoid shutdowns and the expense of frequent (often useless) repairs. Also, you get the many benefits of new Modine efficiency.

Motors are designed for lower power consumption. Sealed-in bearings eliminate need for periodic lubrication. New vertical fins discourage accumulation of dirt, lint and other materials. Other Modine features include improved structural strength and durability . . . quieter operation . . . lighter weight. They add up to low-cost maintenance, better heating performance and greater fuel economy.

Find out how *YOU* can replace unit heaters with new Modines and save money. Use the coupon to get full information.

MODINE MANUFACTURING COMPANY
1563 DeKoven Ave., Racine, Wisconsin

I would like full information on replacement costs ☐; also wall chart and "Repair or Replace?" bulletin ☐.

Name .....

Firm .....

Address .....

SU-1371

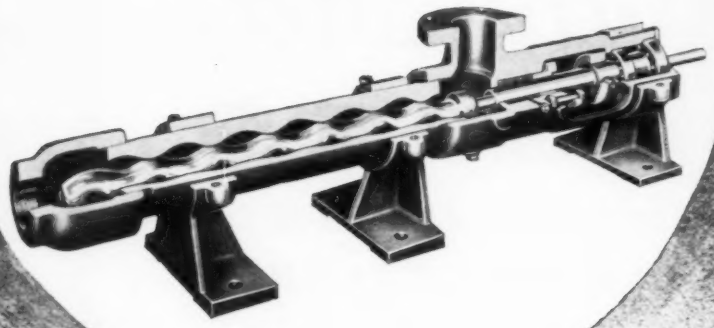
FREE ON REQUEST — Useful, new 22" x 24" wall chart of unit heater maintenance tips. Shows what to look for when units aren't performing right. Also, Modine's new "Repair or Replace?" bulletin. Mail the coupon today!

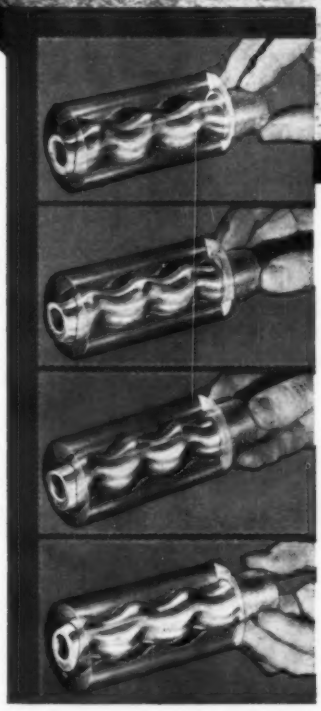
Modine
MANUFACTURING COMPANY

In Canada: Sarco Canada, Ltd., Toronto, Ont.

For more facts circle 513 on Reply Card

IF IT CAN BE PUSHED THROUGH A PIPE... A MOYNO® WILL PUMP IT!





■

Moyno's exclusive "progressing cavity" principle permits hundreds of formerly "unpumpable" materials to be handled successfully. The screw-like rotor revolves in a double threaded stator forming "progressing cavities" that move the material smoothly without foaming, aerating, crushing or excessive pump wear.

Typical materials pumped include non-pourable pastes, slurries, chemicals, foods, acids, even suspended solids up to one inch in size. Capacities available up to 500 gpm and pressures up to 1000 psi.

No doubt a Moyno Pump can cut costs drastically for you. *Write for Bulletin 30-PE.*

R&M®

ROBBINS & MYERS, INC.

SPRINGFIELD, OHIO | BRANTFORD, ONTARIO

MOTORS · FANS · HOISTS · MOYNO PUMPS · INDUSTRIAL PROPELLAIR FANS

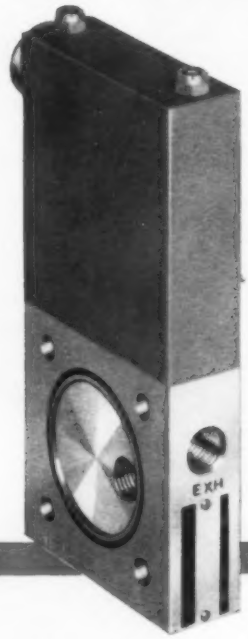
For more facts circle 514 on Reply Card

Introducing the new

HUNT

Slim Line VALVES

SOLENOID, SINGLE PILOT
DOUBLE PILOT, LEVER
OR BALL ACTUATED



ONLY 1″ THICK BY 3″ WIDE

Compact, light in weight, and easily manifolded, these new Hunt valves have been designed specially for use when mounting space is limited. Ideally suited for controlling small cylinders, or to operate diaphragms, pilot cylinders or other devices. Pressures to 125 psi.

Proven, dependable Hunt construction, with hollow, radially ported stainless steel plunger; and "O"-ring seals accurately positioned with metal spacers, held rigidly in metal to metal end abutment. No lapped joints and no rubbing of metal against metal to cause wear, assuring long, efficient, maintenance-free operation.

Easily manifolded. The side of each valve is counterbored; trepanned for an "O"-ring and provided with four through holes. This permits up to eight valves to be manifolded together in any of four 90° angle positions, and operated simultaneously from a single supply;— or up to sixteen valves from two supply sources.

More startling HUNT designs to come!

Send for the "SLIM LINE" Bulletin No. 581 TODAY!

HUNT
Quick-As-Wink® AIR AND HYDRAULIC
CONTROL *Valves*

Manufactured by HUNT VALVE COMPANY, 2082 East Pershing St., Salem, Ohio
For more facts circle 515 on Reply Card

BULLETINS just released and of immediate plant interest

On pages 219-220 are two postage-free Reader Service Cards provided for your convenience in ordering these bulletins. You may also use the cards to order any literature mentioned in ads.

CONSTRUCTION

101 Open-Web Steel Joists—Manual 3001-N, 36 pp, describes open-web steel joists for construction of lightweight, economical and safe floor and roof systems. Covers shortspan, longspan, and electro-channel types, with top chord replaced by a hollow duct serving as a structural member and underfloor electrical distribution duct. Tabulates available dimensions, properties and allowable loading, specifications and handling procedures. Ceco Steel Products Corp.

102 Wood Block Floors—Maintenance of new and old industrial wood block floors is explained in detail in this booklet. Helpful tips are also given on reconditioning old floors. Recommended practices to assure continued low maintenance costs are given, and correct uses of cements and sealers explained. The Jennison-Wright Corp.

103 Heat-Resistant Flooring—This bulletin describes four-step process for laying heavy-duty, heat-resistant flooring in order to obtain maximum heat and thermal shock resistance under a variety of applications. Illustrations are included, cost and time saving factors discussed, and dimensions and specifications given. Walter Maguire Co., Inc.

104 Aluminum Grating—This 8-pp bulletin contains load tables and engineering data on three types of aluminum grating—Roll-Lock, riveted and pressure-locked. Photos and dimensional diagrams are also included. Kerrigan Iron Works, Inc.

105 Curtain Wall Insulation—Booklet FB-104, 12 pp, describes Foamglas, a cellular glass insulation for curtain wall construction. Outlines physical properties of Foamglas and recommended specifications. Ten outstanding curtain wall buildings are featured and each case study includes general information, job data and panel drawings. Pittsburgh Corning Corp.

MATERIALS HANDLING

106 Power Conveyors—Packaged power conveyor units of both stationary and portable design for either horizontal or inclined conveying is illustrated and described with photos, cross-sections and dimension charts in this loose-leaf bound catalog. In addition, it covers accessory items, such as center and end drive units, end take-up units, end idler pulleys, roller bed, return rollers, belting. Harry J. Ferguson Co.

107 Improved Conveyor Belt—Bulletin M302, 12 pp, on the Ray-Man conveyor belt, stresses compensation afforded. Pages are arranged to represent an actual cross-section of the belt, and text covers flexibility, resilience to shock loading, serviceability, other advantages of the compensated belt. Raybestos-Manhattan, Inc.

108 Vibrating Feeders—Standard and special model electro-magnetic vibrating feeders for hard-to-handle bulk materials are featured in this 30-pp bulletin. Amply illustrated, the booklet contains complete descriptions, data and specifications, and a variety of application diagrams, and shows typical installations. Syntron Co.

STORAGE EQUIPMENT

109 Steel Shelving—Advantages and features of company's line of boltless steel shelving are detailed in 20-pp Catalog 284. Shelving parts are illustrated and complete specifications included. DeLuxe Metal Furniture Co.

110 For Engineered Storage—Bulletin 58B, 16 pp, describes storage systems designed to enable moving greatest volume of an item at one time, as well as storing the most items in a given cube. Descriptive details on a variety of storage racks, tiering frames, stacking frames, adjustable pallet racks, bolted racks, finger racks, drive-in pallet racks and other equipment are given. The Paltier Corp.

TOOLS AND WELDING

112 Power Tools—Full details are included in 52-pp Catalog 59 on a line of band saws, contour saws and band filers, jig saws, saw jointers, saw tables, shapers and shaper cutters, drill presses, tool and knife grinders, jointers, lathes, planers, belt and spindle sanders, spinning tools, motors, controls, supplies and accessories. Profusely illustrated with photos, drawings and diagrams, bulletin contains detailed specifications and engineering data. Boice-Crane Co.

113 Brushing Tools—This 8-pp booklet describes brushing tools for power finishing and shows various designs and applications. Describes characteristics and typical applications and includes specifications. The Osborn Mfg. Co.

114 Power Tools—Some of the industrial power tools described in 88-pp Catalog AB-58-2 are drill presses, grinders, shapers, planers, jointers, metal and wood cutting lathes, tilting arbor saws, unisaws, band saws and radial saws. Complete specifications, catalog listings and descriptions of accessories for all tools are included. Action photos and drawings supplement the text. Delta Power Tool Div., Rockwell Mfg. Co.

115 Welding Supplies—Catalog 9-13 contains 52 pp of information on welding supplies and accessories. Illustrated with photos, drawings and diagrams, booklet covers fluxes and ferrous and non-ferrous rods for gas welding, and accessory items including protective clothing, goggles, electrode holders, sparklighters, cable hose, weld cleaning tools, cylinder trucks, and other items for arc and gas welding. Air Reduction Sales Co., Div. Air Reduction Co., Inc.

MECHANICAL POWER TRANSMISSION

116 Speed Reducer—Book 2618 contains 24 pp of engineering and selection information on single reduction drives in six sizes, with nominal ratics of 5 to 1 and capacities up to 50 hp, and double reduction drives in seven sizes, with nominal ratios of 15 to 1 and up to 40 hp. Photos and dimensional diagrams are included. Link-Belt Co.

117 Dry Fluid Drives—An expanded line of dry fluid drives and couplings is described in 24-pp Bulletin A-640B. Complete with product photos and engineering drawings, installation pictures showing applications in a broad cross-section of industry, it explains how this device solves many difficult drive problems. Dodge Mfg. Corp.

118 V-P Drives, Motor Bases—In addition to providing full selection data for company's variable pitch drives, 12-pp Catalog V-183-B features a new welded steel sliding motor bases. These are particularly applicable for wide range variable pitch drives requiring more take-up than many V-drives. Browning Mfg. Co.

PACKINGS, SEALS

119 Compression Packings—Featured in this 22-pp catalog is a line of compression packings, including both sheet and rod seal types. Describes packing materials and includes sections on recommended packings for various services, including air and inert gases, pharmaceuticals, foodstuffs and beverages, paper and textile processing, water, petroleum, and acid service, alkalis and steam service, others. Packing recommendation chart is included. E. F. Houghton & Co.

120 Mechanical Seal—Eight-pp Bulletin AD-164 describes a corrosion-resistant mechanical seal that combines properties of Teflon with features of bellows design. Lists advantages of bellows design, types of seals available, optional designs, specifications and installations. The Garlock Packing Co.

PUMPS, COMPRESSORS

122 Reciprocating Pumps—Described in 8-pp Bulletin 758 are three types of reciprocating pumps for chemical proportioning and power service, capacities from 2cc per hour to 675 gph. Forty-two standard sizes are tabulated with pressure and horsepower data. Describes Purgeport feature of these pumps which permits cleaning without breaking piping, bleeding air from pump, showing pumping action, etc. Jaeco Pump Co.

123 Sump Pump Guide—Sixteen-pp Bulletin 4500-B, on sump pumps, emphasizes construction advantages of the

BULLETINS

(Begins on page 21)

heavy-duty sump pumps in the line; outlines various guide bearing assemblies available for the larger line of pumps; introduces new vertical dry pit and immersion process pumps, others. Provides ordering and installation data, ratings, dimensions, information on control equipment. Illustrated, and includes prices. The Deming Co.

124 Gas Pumps—Rotary positive gas pumps available in 18 sizes are covered in 6-pp Bulletin XA-458. Technical rating data are presented along with design and construction data to aid in selection and application of the equipment. Roots-Connersville Blower, Div., Dresser Industries, Inc.

125 Centrifugal Compressors—Twenty-pp Bulletin 909 describes construction and operating features of centrifugal compressors and lists typical applications. Ratings are tabulated for typical pressure-volume-horsepower selections. Arrangements are illustrated, as are design features. Impeller balancing and test procedures are discussed. Also covered are bearing pedestal design and lubrication system, and a section is devoted to controls. American Blower Div., American-Standard.

VALVES, PIPE AND TUBING

126 Filter Control Valves—Bulletin W-17 describes valves for surface wash water applications on filters and for controlling flow of water to filters. Operating layouts, operation, construction and dimensions are included, along with specifications. Golden-Anderson Valve Specialty Co.

127 Valve-Regulator Manual—Installation, operation and maintenance instructions for company's valve-regulators are given in 16-pp Bulletin 1099. These pneumatically controlled, cylinder operated, lubricated plug valve regulators are designed to provide high-pressure large-volume gas regulation. Typical installations, mounting and piping arrangements are illustrated. Sections of the book cover typical operational troubles, how to check troubles, orifice and nozzle cleaning. Rockwell Mfg. Co.

128 Plastic-Lined Valves—Bulletin 114 describes Penton plastic-lined valves compatible with glass, plastic, metallic and lined piping. Characteristics, advantages, and temperature and pressure specifications are covered, and chemical resistance ratings for a variety of services listed. Hills-McCanna Co.

129 Pipe and Tubing—Bulletin 20, 16 pp, on Fibercast chemical and line pipe, tubing and fittings, is an engineering data and information booklet. Provides pipe strengths, chemical resistance, specifications, installation procedures and application information. Bulletin is illustrated. Fibercast Co.

130 On Buttweld Tubing—This 60-pp handbook of cold, drawn, buttweld mechanical steel tubing describes its manufacture, use and economies in industry. Pertinent metallurgical, mechanical and engineering data are included. Text, photos and drawings explain each step in buttweld production, finishing and inspection, types of product available through various mill treatments and supplementary forming operations. Book clarifies engineering and cost considerations leading to use of buttweld tubing in many jobs. Pittsburgh Tube Co.

FANS AND BLOWERS

132 Mechanical Draft Fans—Eight-pp Catalog 1361 describes centrifugal fans designed for handling abrasive gases at elevated temperatures. Complete application, performance, and physical data are given, as well as a list of optional accessories. Sturtevant Div., Westinghouse Electric Corp.

133 Air Moving Units—Illustrated and described in 16-pp Bulletin 5412 is a line of special purpose air moving units, including packaged centrifugal blowers, vaneaxial fans, tubeaxial fans, propeller fans, pressure blowers, and fluid coolers. Specifications include capacity range, operating speed, construction features and typical applications. American Blower Div., American-Standard.

134 Tubeaxial Fans—Performance and dimension specifications on Series 300 tubeaxial fans are presented in 8-pp Catalog 1110-B. Charts recommended stack sizes, maximum horsepower, and maximum motor speed for variable stack velocity and air flow output are included. Sturtevant Div., Westinghouse Electric Corp.

HEATING AND COOLING

136 Gas-Fired Heaters—Advantages of company's gas-fired unit heaters are detailed in 8-pp Catalog gf-58. Among the subjects covered are unit location, mounting heights, length of throw, performance specifications, weights and dimensions. Grinnell Corp.

137 For Quiet Heating—Described in this bulletin is the HusHeater, designed to heat—without making a sound—water and liquids by introduction of steam into the liquid. Lists advantages of the HusHeater, explains how to install it and tells how to order. Most common application is in filter boxes and hotwells; other applications are in heating processes in sugar refineries, others. Sims Pump Valve Co. Inc.

138 Cooling Coils—Fifty-pp Bulletin 880 contains cooling coil selection information as well as detailed descriptive information on the coils, including direct expansion coils and both standard and cleanable tube water coils. Included in addition to numerous photos are construction specifications, dimensional data, surface charts, circuiting diagrams, capacity rating tables and detailed refrigerant pressure drop charts. American Air Filter Co., Inc.

139 Water Chilling System—Catalog EM-238 describes features and advantages of a completely packaged centrifugal water chilling system. Dimensions and weights are tabulated and engineering data given. York Corp.

Postage-free Reader Service Cards make it easy to order bulletins. Cards are provided on pages 219-220.

WATER, WASTE TREATMENT

141 Water Treatment Equipment—An outline of modern water treatment equipment is presented in this 10-pp bulletin. Discusses water impurities and methods of treatment, typical water-treatment systems, aerators, degasifiers, deaerators, chemical feeders, precipitation equipment, filters, and ion exchange equipment. Lists nine ways to demineralize water, by ion exchange. The Permutit Co.

142 Demineralizing Handbook—Publication 5800-D is a 36-pp handbook on demineralizing, featuring sections on history of water treatment, definition of terms, building the demineralizer system, and describing various types of demineralizer operations. Photos, drawings, flow diagrams, and graphs are included. Cochrane Corp.

143 For Water Treatment—Featured in this 8-pp bulletin is a range of equipment for water treatment, including Aerators, degasifiers, deaerators, chemical feeders, precipitation equipment, filters, and ion exchange equipment. Also describes and illustrates gas analysis and control systems, meters, flow controllers. The Permutit Co.

144 Plating Waste Treatment—Variations in design of plating waste treatment systems are discussed in 6-pp Technical Reprint T-163. Describes various systems and methods, both batch and continuous, which may be used in the treatment of hexavalent chromium, cyanides, acids and alkalis. Graver Water Conditioning Co.

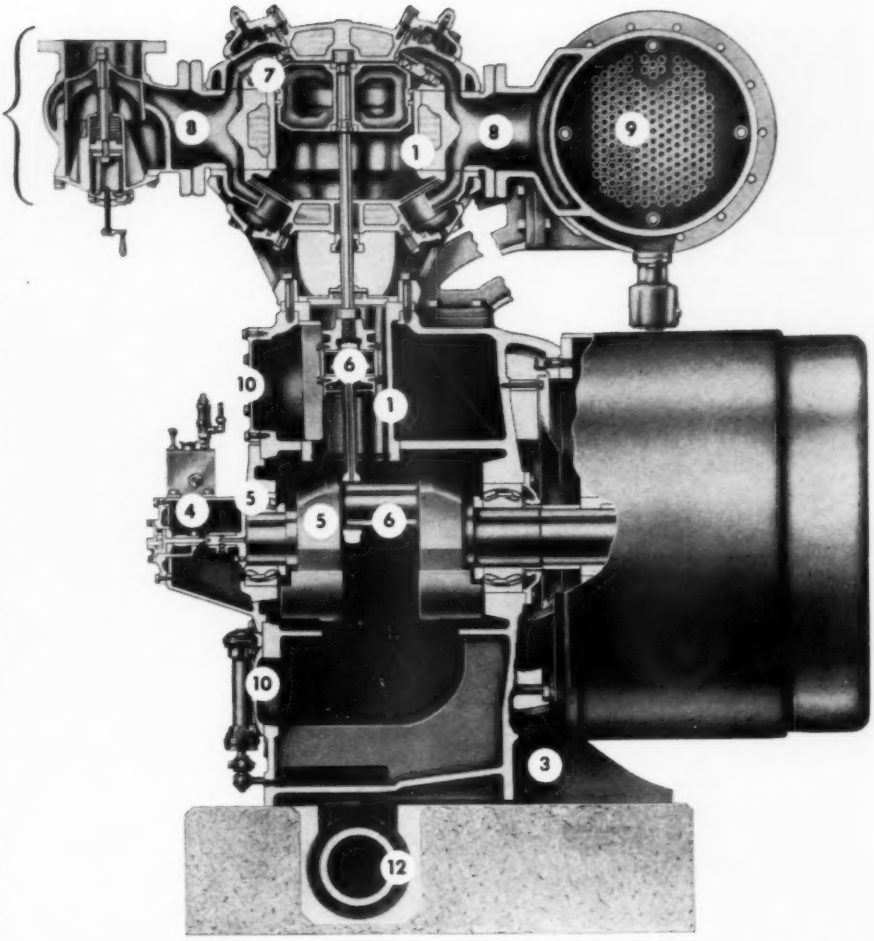
ELECTRICAL

145 Synchronous Motors—Booklet B-7292, 28 pp, contains motor selector charts, application data, and formulas for calculating power factor for synchronous motors and controls. Presents a quick summary of types and features of motors and controls, and includes a discussion of power factor correction, factors to consider in selecting motor, and special application problems. Westinghouse Electric Corp.

146 Open-Type Motors—Super-Seal motors for many applications usually requiring enclosed designs are described in Bulletin 05-51B9040. Available in integral horsepower frames, these motors are reportedly unaffected by moisture, dust, dirt, oils, acids and alkalis. In addition to lower cost, they have a 1.15 service factor. Allis-Chalmers Mfg. Co.

147 Outdoor Motors—Six-pp Bulletin 2550 describes horizontal weather-protected motors from 250 to 2000 hp, designed for outdoor use under extreme weather conditions. Cutaway drawings show construction. Standard and special features are described and specifications given. The Louis Allis Co.

(More Bulletins on page 221)



1. Honed, replaceable crosshead and cylinder liners of special alloy iron.
✓ One-piece, box type tinned cross heads—NO ADJUSTMENT NECESSARY.
3. Scientifically ribbed, broad based main frame of semi-steel.
4. Integral force-feed running gear lubrication through rifle-drilled passages. Separate force-feed system for cylinders.
5. Heat-treated, drop-forged crankshaft and spherical-roller-type main bearings. NO ADJUSTMENT NECESSARY
6. Precision type, steel back crankpin bearings and bronze crosshead pin bearings, force-feed lubricated.
7. Patented "Dual-Cushion" Valves —large area, low lift, durable, efficient and quiet, set at most efficient angle in both heads.
8. Large, streamlined air passages minimize friction losses, reduce power consumption.
9. Dual copper tube intercoolers with cast iron shell for quiet operation, true counter flow design and built-in moisture separator
10. Convenient inspection openings with dust proof, oil-tight covers.
✓ Water jacket cleanout openings.
12. Discharge piping furnished provides single outlet for easy installation.
13. Standard Joy total closure control provides lowest possible power consumption. Other control systems available.

Mr. Engineer: Here are some BUY features of JOY AIR COMPRESSORS

There are three major by-products of the BUY features listed above; they are savings in *installation, maintenance* and *operation.*

INSTALLATION: Because of "Packaged" design, Joy Compressors are shipped ready to hook up and run. No assembly needed. And you save up to half the normal cost because Joy Compressors require less foundation.

MAINTENANCE: All wearing parts—valves, crosshead guides, cylinder liners, etc.,—are field replaceable. This is an exclusive Joy feature. No special tools or special maintenance crew training required.

OPERATION: Precise balance and control requires less horsepower than any other system, delivers greater economy on CFM and KWH per HP.

Joy Compressors range from 1.93 to 6048 CFM with wide choice of Prime movers and drives. Write ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

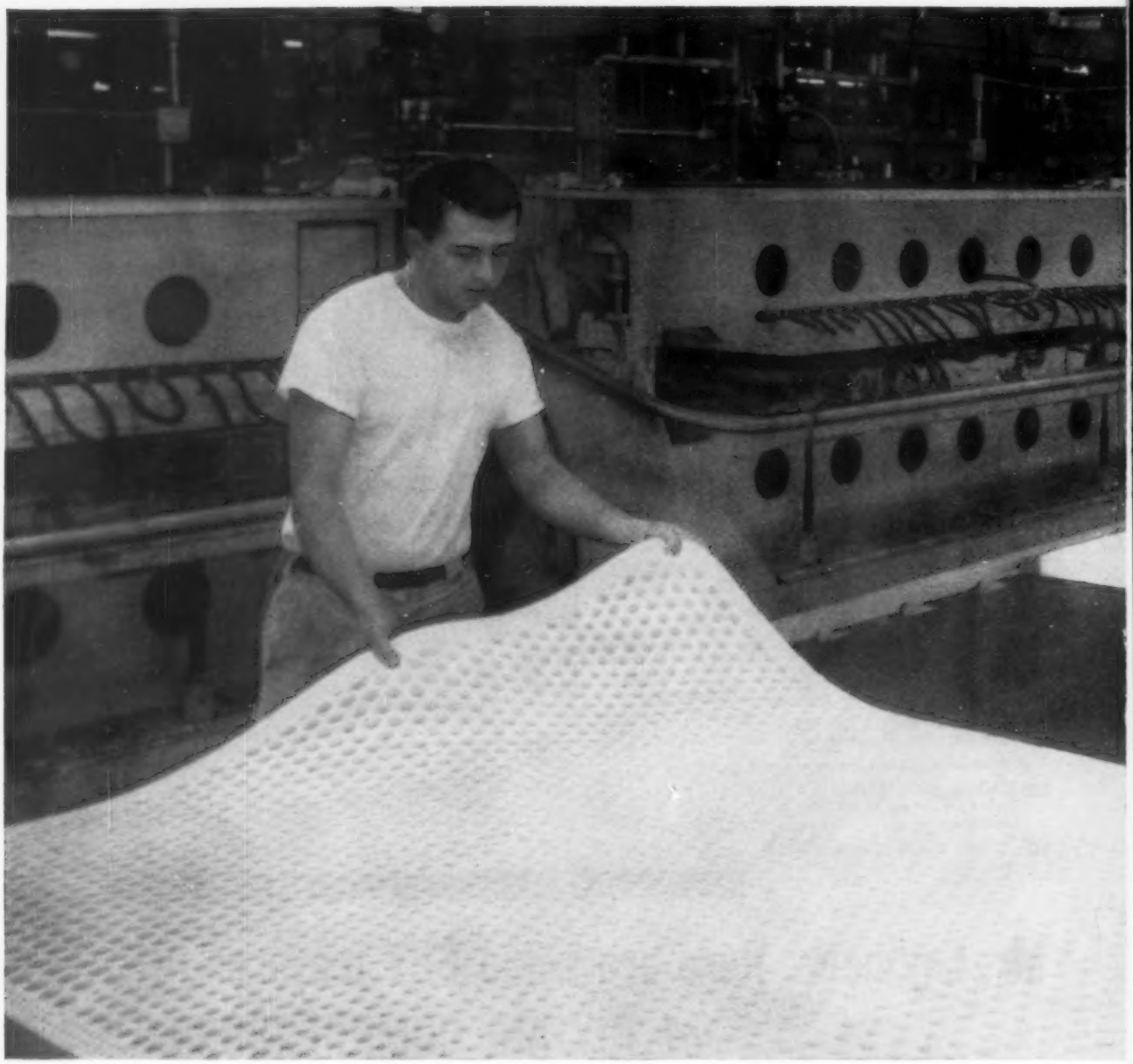
WRITE FOR FREE BULLETIN 242-15

JOY ***SAVES YOU MONEY ON AIR***

COMPRESSORS • FANS • DUST COLLECTORS

WSW I 7162-242

For more facts circle 516 on Reply Card



125 B. F. Goodrich presses, using Gulf Harmony Oil, mould

GULF MAKES THINGS

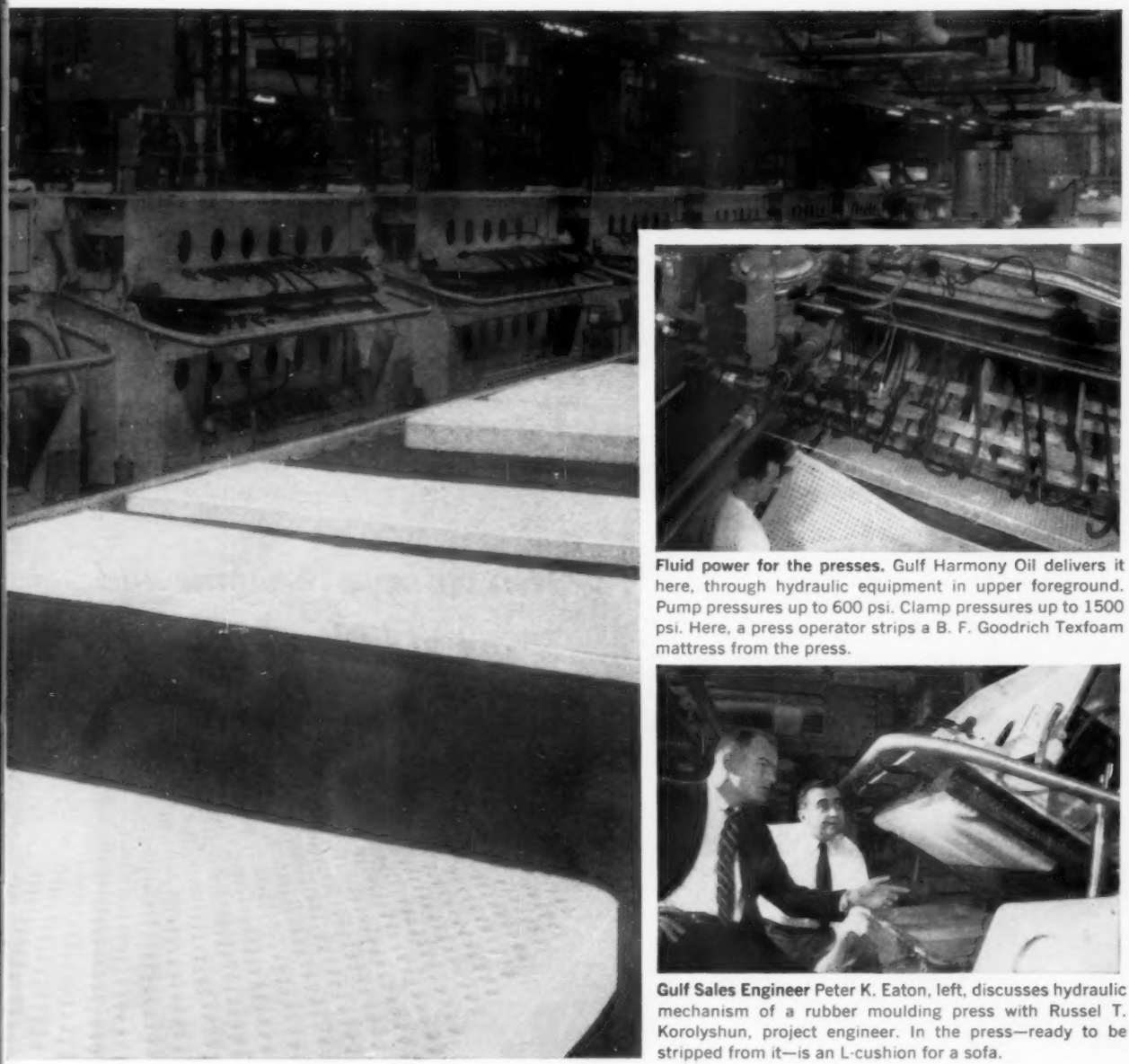
"We'd be up to our necks in expensive scrap if we used an inferior hydraulic oil," says Alex Sandomirsky, chief engineer at the B. F. Goodrich Sponge Products Division in Shelton, Connecticut.

The plant turns out highest quality B. F. Goodrich Texfoam mattresses, pillows, auto seat and furniture cushions around the clock. It has the world's largest installation of rubber moulding presses, 125 of them on one central, 700-gallon hydraulic system. The oil in this system *has* to be reliable, for if one press went out all would have to close down.

B. F. Goodrich uses Gulf Harmony Oil 53 as the power medium, serving these presses 24 hours a day, 6 days a week . . . tough service for any hydraulic oil. Gulf Harmony stands up perfectly in this operation, to the complete satisfaction of B. F. Goodrich. Production results are excellent.

Here's why Gulf Harmony Oil stands up so well, so long

New Gulf Harmony has outstanding oxidation resistance. It assures longer life, freedom from harmful sludge deposits. An anti-corrosion additive protects against rust. A patented anti-foam agent eliminates objection-



Fluid power for the presses. Gulf Harmony Oil delivers it here, through hydraulic equipment in upper foreground. Pump pressures up to 600 psi. Clamp pressures up to 1500 psi. Here, a press operator strips a B. F. Goodrich Texfoam mattress from the press.

Gulf Sales Engineer Peter K. Eaton, left, discusses hydraulic mechanism of a rubber moulding press with Russel T. Korolyshun, project engineer. In the press—ready to be stripped from it—is an L-cushion for a sofa.

foam rubber 24 hours a day . . .

RUN BETTER!

able foaming. Original viscosity and color stability are retained longer.

As a multi-purpose lubricant and hydraulic fluid, Gulf Harmony Oil is available in a full selection of grades to meet all your needs. It is ideal for hydraulic systems, air compressors, blowers, dryer-roll bearings, machine tools, electric motors, central circulating systems and a host of other applications.

Your Gulf Sales Engineer can show you how Gulf Harmony Oil can help you improve production and reduce maintenance costs. Just call your nearest Gulf office, or write for illustrated bulletin.

GULF

GULF OIL CORPORATION
Dept. DM, Gulf Building
Pittsburgh 30, Pa.

Without obligation on my part, send me illustrated bulletin on Gulf Harmony Oil.

Name_____

Title_____

Company_____

Address_____

City_____ Zone____ State_____

PE-5213

For more facts circle 517 on Reply Card

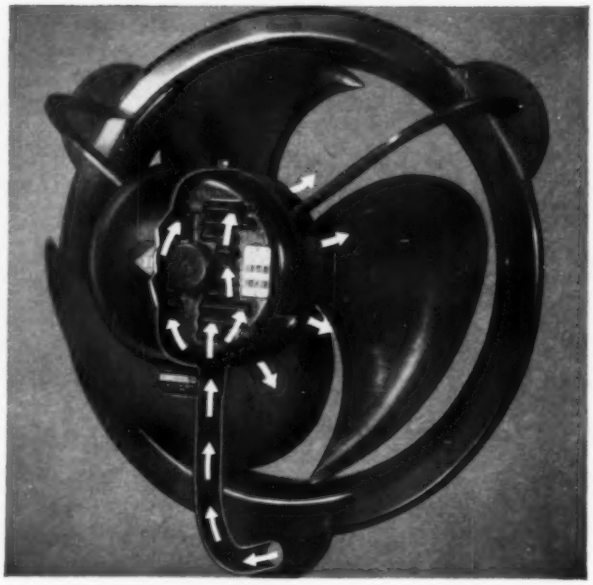
When it's ventilating equipment...

Just exactly what do *you* look for when you're after ventilating equipment? What features stand out in *your* mind as most important? What "makes" Quality Equipment, with a capital "Q"?

We wanted to know, so had an independent research organization conduct a nationwide survey among consulting mechanical engineers.

Here's why ILG *fans and cost so little to maintain,*

"X" Marks the Spot where the "traveling" mike is placed to pick up sound waves from this Ilg BC Airfoil Centrifugal Fan. Direct-connected Ilg-built motors eliminate the noisy slip and slap of belts and pulleys. In addition, Ilg Backward Curved Blades and airfoil design cut down eddy currents and turbulence for quieter operation.



How to Have Your Cake and Eat It. With Ilg Propeller Fans you get the operating cost advantages of *open-type* motors plus the protection of *totally enclosed* motors. Vent pipe brings in outside air to *pressure-cool* single-phase permanent-split capacitor and 3-phase motors. Casing protects motor windings against deposits. "One-Name-Plate" guarantee covers *both* fan and motor.

For fans built to satisfy your "specs"...

consulting engineers put low maintenance costs high on the list

What did we find out? That *low maintenance costs* were a primary consideration with about three out of every four consulting engineers.

A glance below will show some of the reasons why Ilg fans and ventilators *cut maintenance costs* to the absolute minimum. And don't overlook some of the *other* Ilg strong points preferred by consulting engineers; for example: quiet operation, vibration-free performance, low operating costs.

For further details of why Ilg rates so high with those who specify, send for Catalog No. 153 on propeller fans, Bulletin No. 257 on airfoil centrifugals, Bulletin Nos. 2301 and 2700 on power roof ventilators.

motors and ventilators operate so quietly

Last Look You'll Ever Have. Look now—because there's never any need to take an Ilg motor apart later. No centrifugal switches to wear or fail. Double-sealed, permanently lubricated ball bearings plus dynamically balanced moving parts assure smooth operation. Direct drive eliminates belt maintenance. Lower starting torque subjects permanent-split capacitor motor to less initial shock . . . lengthens motor life.

What's Inside Counts, Too. Beneath the lifetime aluminum housing of this low-silhouette Ilg Power Roof Ventilator purrs an Ilg-built motor direct-connected to the super-silent "Q"-type fan wheel. 11 sizes available. Choice of single-phase permanent-split capacitor or 3-phase motors.

specify ILG

ILG ELECTRIC VENTILATING COMPANY
2832 N. Pulaski Road, Chicago 41, Illinois
Offices in 57 Principal Cities
Member of Air Moving and Conditioning Association Inc. (AMCA)

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MOUNTING GLAND
Eliminated
ON
CHEMPRO
"Wedge-Lock"
mechanical seals

The Chempro line of external "wedge-lock" seals does not require a mounting gland, or any modification to the stuffing box, to align and hold the Chempro seal in position. The patented "wedge-lock" design automatically seats the seal stator in the stuffing box in perfect face-to-face alignment with the seal rotor on the shaft. Simple and easy to install—*in only 20-30 minutes.*

OTHER ADVANTAGES

- Completely Interchangeable with Packing
- Simple in Design—Only 8 Parts
- Chempro Teflon* Shaft Packing—Chemically Inert
- External Seals Adjustable After Installation
- Parts Interchangeable Between Seal Styles
- External and Internal Seals Available—From Vacuum to 100 psi

*du Pont trademark

Write for Bulletins CP551 and 575

CHEMICAL & POWER PRODUCTS, Inc.

7 Broadway, New York 4, N. Y.

For more facts circle 519 on Reply Card

BACKTALK AND FORETHOUGHTS

Edited by Marjorie E. Weissman

Sold—Plant Engineering Project

PLANT ENGINEERING:

"There's an article in the July, 1958, issue of PLANT ENGINEERING by Burke M. Wombacher, Plant Engineering Consultant, Redondo Beach, California, captioned, 'To Sell a Plant Engineering Project . . . Speak Effectively' of which we would very much like to receive 25 copies as soon as possible.

"If there is a charge in connection with this request for reprints, if you have the invoice sent to me, payment will be made promptly." *H. F. King, Industrial District Manager, Socony Mobil Oil Co., Inc., Boston, Mass.*

► While the supply lasts, we are glad to provide tear sheets free of charge.—*Editors.*

Controlling, Scheduling Preventive Maintenance

PLANT ENGINEERING:

"We are interested in obtaining information on different methods of organizing plant maintenance departments, with particular emphasis on controlling and scheduling preventive maintenance programs.

"We wonder if you have recently published articles on the subject and whether it would be possible to obtain reprints or copies of the issues in which they appeared. Your assistance would be greatly appreciated." *D. M. Turnbull, Industrial Engineer, Canadian Trailmobile, Ltd., Scarborough, Ont., Canada.*

► Recently published articles include "Preventive Maintenance Procedures and Forms," in January; "How To Get Real Control of Contract Maintenance," in April; and "Controlling Costs on Plant Orders," in July, all 1958. Copies of these articles have been forwarded to our correspondent, also a booklet containing 12 articles on maintenance, reprinted from earlier issues of PLANT ENGINEERING.—*Editors.*

Information on Water Conservation

PLANT ENGINEERING:

"In going through the July, 1958 issue of PLANT ENGINEERING I find that some tearsheets of the February, 1958 article entitled 'Water Is To Save—Ideas that Conserve Dollars, Too, at G.E.' are still available.

"We are extremely interested in the above subject and would appreciate a copy of the article." *Leo Peleske, Engineer, Maintenance and Construction Div., AC Spark Plug Div., General Motors Corp., Flint, Mich.*

► We are pleased to forward copies of this much-in-demand article, with the compliments of the editorial department.—*Editors.*

Industrial Lighting Reprint

PLANT ENGINEERING:

"Would it be possible for us to obtain 50 copies of the article 'Industrial Lighting,' a reprint from the January, 1958 issue of PLANT ENGINEERING magazine. It was authored by Edward G. Arsnow, Engineer, Merrimack Valley Works, Western Electric Co. If 50 copies are available we would be happy to pay any charges for them." *R. H. Marquardt, Press Relations, General Electric Co., Nela Park, Cleveland, Ohio.*

► This 12-page reprint is still available at 50 cents each.—*Editors.*

Writing Specifications for Construction Contracts

PLANT ENGINEERING:

"We would very much appreciate receiving from you the 16-page section on 'General Conditions' applicable to all construction, which you offer on page 112 of your September 1958 issue.

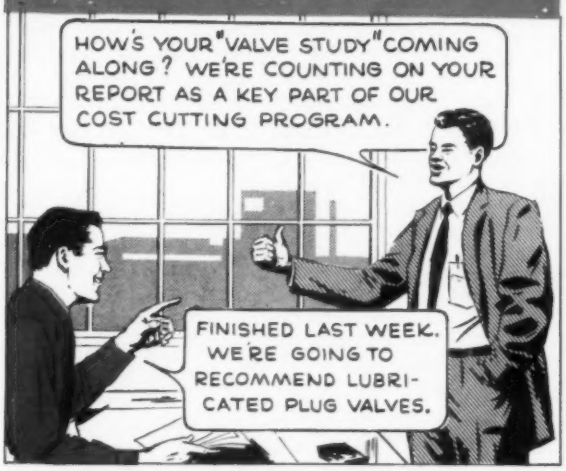
"I have found these articles most interesting and useful and would appreciate receiving this section complete with reproductions of the bulletins shown in this copy of your excellent magazine." *S. S. Prince, Chief Engineer, U. S. Vitamin Corp., Arlington-Funk Laboratories Division, New York, N. Y.*

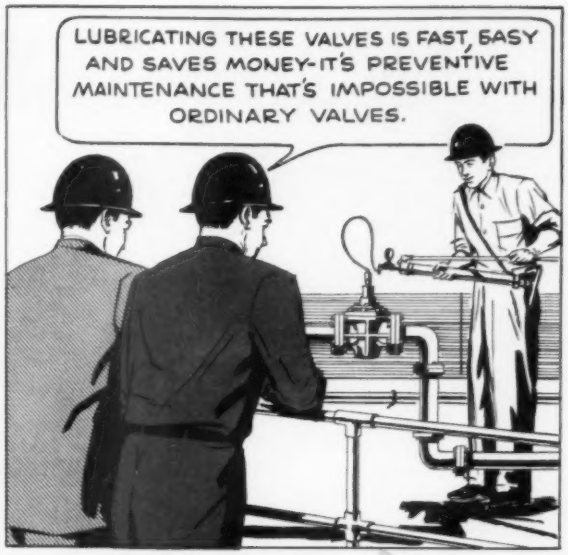
PLANT ENGINEERING:

"On page 112 of your September, 1958, issue of PLANT ENGINEERING, you offer, upon request made on company letterhead, a 16-page copy of section A, 'General Conditions.' You also offer full size reproductions of bulletins covering changes in specifications or plans, contract change order forms, useful index

COST CUTTING IN ACTION

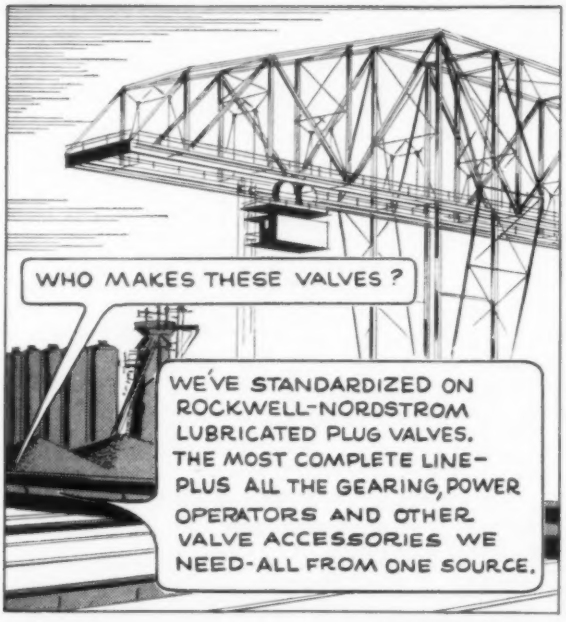
by Rockwell-Nordstrom


HOW'S YOUR "VALVE STUDY" COMING ALONG? WE'RE COUNTING ON YOUR REPORT AS A KEY PART OF OUR COST CUTTING PROGRAM.
FINISHED LAST WEEK. WE'RE GOING TO RECOMMEND LUBRICATED PLUG VALVES.


LUBRICATING THESE VALVES IS FAST, EASY AND SAVES MONEY-IT'S PREVENTIVE MAINTENANCE THAT'S IMPOSSIBLE WITH ORDINARY VALVES.

WHAT DOES THE LUBRICANT DO?
PRESSURIZED LUBRICANT IN THESE SEALING GROOVES FORMS A LEAKPROOF SEAL AND ALSO ELIMINATES METAL-TO-METAL WEARING FRICTION. SEATS CAN'T BE CORRODED OR CUT BECAUSE THEY AREN'T EXPOSED TO THE LINE.

SOUNDS GOOD.
IT IS GOOD. ON EVERY PLANT SERVICE WE'VE TESTED WE GET TIGHTER SHUT-OFF AND EASIER OPERATION. PROTECTED SEATING PLUS THE BENEFITS OF LUBRICATION CUT OUR VALVE MAINTENANCE COSTS TO ROCK BOTTOM.


WHO MAKES THESE VALVES?
WE'VE STANDARDIZED ON ROCKWELL-NORDSTROM LUBRICATED PLUG VALVES. THE MOST COMPLETE LINE-PLUS ALL THE GEARING, POWER OPERATORS AND OTHER VALVE ACCESSORIES WE NEED-ALL FROM ONE SOURCE.

ROCKWELL-Nordstrom VALVES

it's **ROCKWELL**

MANUFACTURING COMPANY

Rockwell-Nordstrom valves are available in a complete range of sizes and ratings in semi-steel, steel, stainless steel and other corrosion resisting metals.

Send Coupon For Free Literature

Rockwell Manufacturing Company
Rockwell-Nordstrom Valve Division
Department CS Pittsburgh 8, Pa.

☐ Please send me complete information on Rockwell-Nordstrom valves for process, industrial and manufacturing flow control.

☐ Please send me the name of your nearest distributor . . . . . ask him (to) (not to) call immediately.

Name _____ Title _____

Firm _____

Street _____

City _____ Zone _____ State _____

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LOOKING for the RIGHT CUTTER for those *IMPOSSIBLE* METAL CUTTING *Jobs!*

Here's the Curtain-Raiser to a Quick Solution!

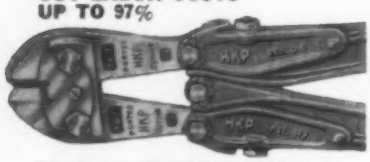
HKP

PORTER CUTTERS

There's a HAND or HYDRAULIC powered PORTER CUTTER to answer your toughest metal-cutting problems — over 100 different cutters, all designed to save you time, labor, and money! Make short work of cutting:

• Bolts • Rods • Screws • Rivets • Wire • Chain • Steel Strapping • Soft, Medium & Hard Metals & Many Others

CUT LABOR COSTS UP TO 97%



The famous PORTER CENTER-CUT CUTTER . . . our most popular tool . . . is the leading all-around cutter for industrial use! For Free Cutting of Soft and Medium Hard Metals up to ¾". Available in 6 sizes.

. . . and for "PRODUCTION" CUTTING

The PORTER WORK-STATION CUTTER can increase one man's output up to 300% in continuous volume cutting! In 3 sizes — up to ½" capacity!

ALSO . . . for those RUGGED JOBS!

The PORTER HEAVY DUTY CUTTER cuts almost anything in metal up to ¾" diameter — thanks to its heat-treated, hard-tempered center-cut jaws! Comes in 3 sizes.

Contact your Industrial Distributor . . . or write for your free catalog with illustrated, detailed descriptions of the versatile PORTER line!

CUT up to ¾" rods with HAND OPERATED TOOLS — up to 1⅜" rods and 2½" power cable with POWER OPERATED TOOLS.

H. K. PORTER, inc.

Somerville 43, Mass.

For more facts circle 521 on Reply Card

BACKTALK— FORETHOUGHTS

and a page from a typical trade specification.

"We would very much like to have these items. Will you please mail them to me at the address shown." *Bill B. Grimes, Construction Engineer, Airports & Facilities Div., Braniff International Airways, Dallas, Texas.*

PLANT ENGINEERING:

"Please send a copy of section A, 'General Conditions' regarding contracts.

"Incidentally, to me, PLANT ENGINEERING is one of the most interesting and valuable publications in its field." *W. F. Hering, Project Control Engineer, Mobay Chemical Co., Pittsburgh, Pa.*

PLANT ENGINEERING:

"We have reviewed your September issue of the PLANT ENGINEERING magazine and have especially enjoyed the articles on construction specifications and the steam trap selection.

"We would like to request three copies of the construction specifications called 'General Conditions' article which you have written as available in your September issue, page 112, for use in our Engineering and Purchasing department.

"If, per chance, the six articles on the steam trap selection series have been printed as a separate little booklet, we would appreciate very much receiving a copy of this also, since it is very handy and keeps all the articles assembled." *R. F. Nicolai, Plant Engineer, Jos. Schlitz Brewing Co., Milwaukee, Wis.*

Reducing Maintenance Costs

PLANT ENGINEERING:

"From time to time, we have read articles in your publication regarding preventive maintenance. We are wondering whether you retain a file whereby it would be possible for you to select several recent articles on reducing upkeep and downtime costs. If so, we would certainly appreciate your cooperation in mailing us the information." *J. P. Keating, Vice President, Neenah Foundry Co., Neenah, Wis.*

PLANT ENGINEERING:

"Will you please send us as much literature as you have available at present on preventive maintenance programs. We would appreciate any articles and reprints you can send us. Thank you for your help in this matter." *Foster L. Lowrey, Maintenance Engineer, Cornell Paperboard Products Co., Milwaukee, Wis.*

▶ A selection of articles from past issues of PLANT ENGINEERING which we think will be helpful, has been sent to these readers.—*Editors.*

Construction Specifications

PLANT ENGINEERING:

"In the August, 1958 issue of PLANT ENGINEERING, the first of a series of articles was published entitled, 'Construction Specifications—How They Can Protect Your Company.'

"If at all possible, I would like to obtain six copies of the complete series. In the event that you are unable to disclose the complete series at this time, it would be greatly appreciated if you would forward six copies of Part 1." *Albert J. Maachi, General Superintendent of Maintenance and Construction, American Cyanamid Co., Bound Brook, N. J.*

Molybdenum as a Lubricant

PLANT ENGINEERING:

"Have you any tear sheets left from your December 1957 issue, pages 114 through 118? If so, please send two sets.

"We appreciate your magazine very much and get many helpful ideas from its fine editorial articles." *J. R. Coverston, Maintenance Supervisor, Owens-Illinois Glass Co., Paper Products Div., Miami, Fla.*

▶ Two sets of tear sheets of this article, "Got Some Tough Lube Problems?", which described some of the uses of molybdenum disulfide as a lubricant, have been forwarded with our compliments.—*Editors.*

Industrial Ventilation

PLANT ENGINEERING:

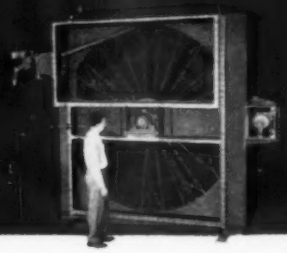
"We are very much interested in the article published in your magazine in January or February 1957, titled 'Industrial Ventilation.'

"Unfortunately, we have only small sections of this report intact. We would very much appreciate receiving a reprint or tear sheets of this article." *L. A. Morrell, Personnel Manager, H. H. Scott, Inc., Maynard, Mass.*

▶ Copies of this eight-page manual for plant ventilation are available at 25 cents a copy.—*Editors.*

HERE'S WHAT YOU CAN DO ABOUT THE HIGH COST OF FUEL

GET MORE HEAT FROM EVERY FUEL DOLLAR WITH A Ljungstrom® Package Air Preheater



By recovering heat from the exhaust gas, the Ljungstrom Air Preheater can increase combustion temperature as much as 400° or more! By raising furnace temperature this way, you permit more heat to be absorbed into boiler tubes or heat transfer surfaces. The results are increased capacity and greater output from every fuel dollar you spend.

And when you credit fuel savings, the installed cost of a Package Ljungstrom can be paid for in approximately two years.

You get maximum heat recovery because the Ljungstrom's exclusive rotary heat transfer element puts the heat back directly into the combustion air, i.e. without passing it through heat-absorbing partitions or tube walls. Package design also gives you all the advantages and economies of the Ljungstrom in a compact, pre-assembled unit. Available in vertical or horizontal models, Package Ljungstroms are readily adaptable to any plant arrangement.

For further information, write today for the free 14-page Package Ljungstrom manual.

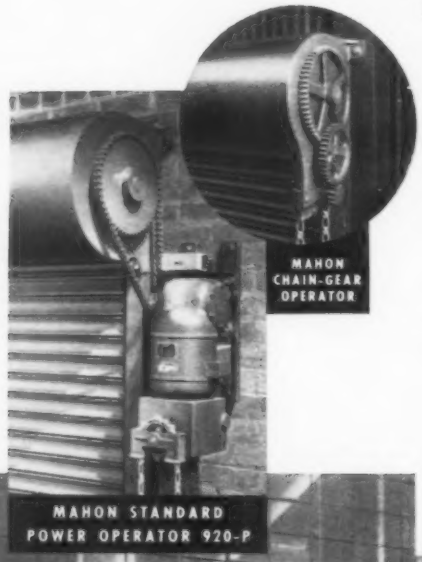
THE AIR PREHEATER CORPORATION

60 East 42nd Street, New York 17, N. Y.

For more facts circle 522 on Reply Card

Rolling Steel Doors

Manually, Mechanically, or Electrically Operated



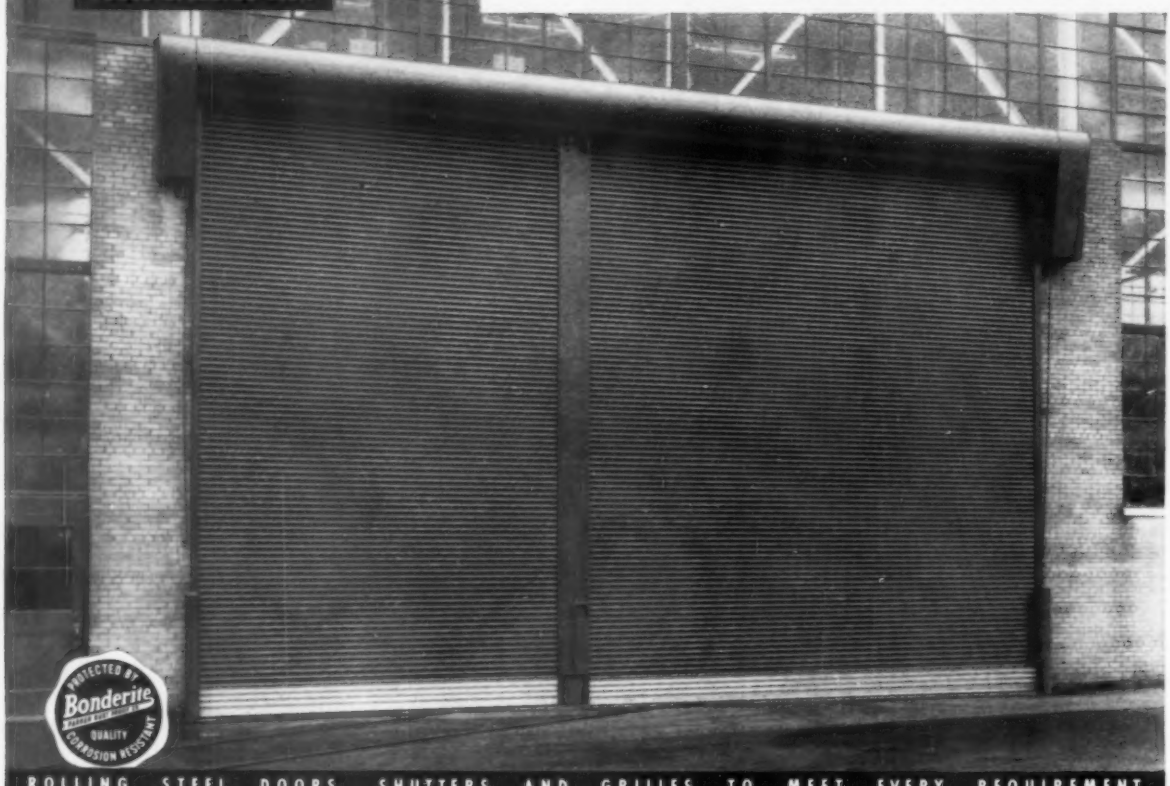
MAHON STANDARD
POWER OPERATOR 920-P

In the combination truck and railroad opening, illustrated below, two Mahon power operated rolling steel doors, with a movable mullion between, solved the problem of an extremely wide opening in which the entire width was required only occasionally for passage of railroad cars. The railroad spur track entered the building at an acute angle which necessitated an opening 36′-9½″ wide for required clearance. It was also necessary to have a truck opening 14′-0″ wide at the same location. The door at the left operates individually as the truck opening. When it is necessary to use the entire railroad opening, both doors are opened and the movable mullion is unlocked and moved clear to the right on an overhead track. When you have a special door problem, consult Mahon engineers. When you buy a rolling steel door, check specifications carefully . . . you will find that Mahon Rolling Steel Doors are built better to give better service over a longer period of time. See Sweet's Files for complete information including Specifications, or write for Catalogue G-59.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

Sales-Engineering Offices in Detroit, New York and Chicago • Representatives in Principal Cities

Manufacturers of Rolling Steel Doors, Grilles, and Automatic Underwriters' Labeled Rolling Steel Fire Doors and Fire Shutters; Underwriters' Rated Metalclad Fire Walls, Insulated Metal Curtain Walls, Electrified M-Floors, Acoustical and Troffer Forms, Acoustical Metal Ceilings, Steel Roof Decks, and Long Span M-Decks.



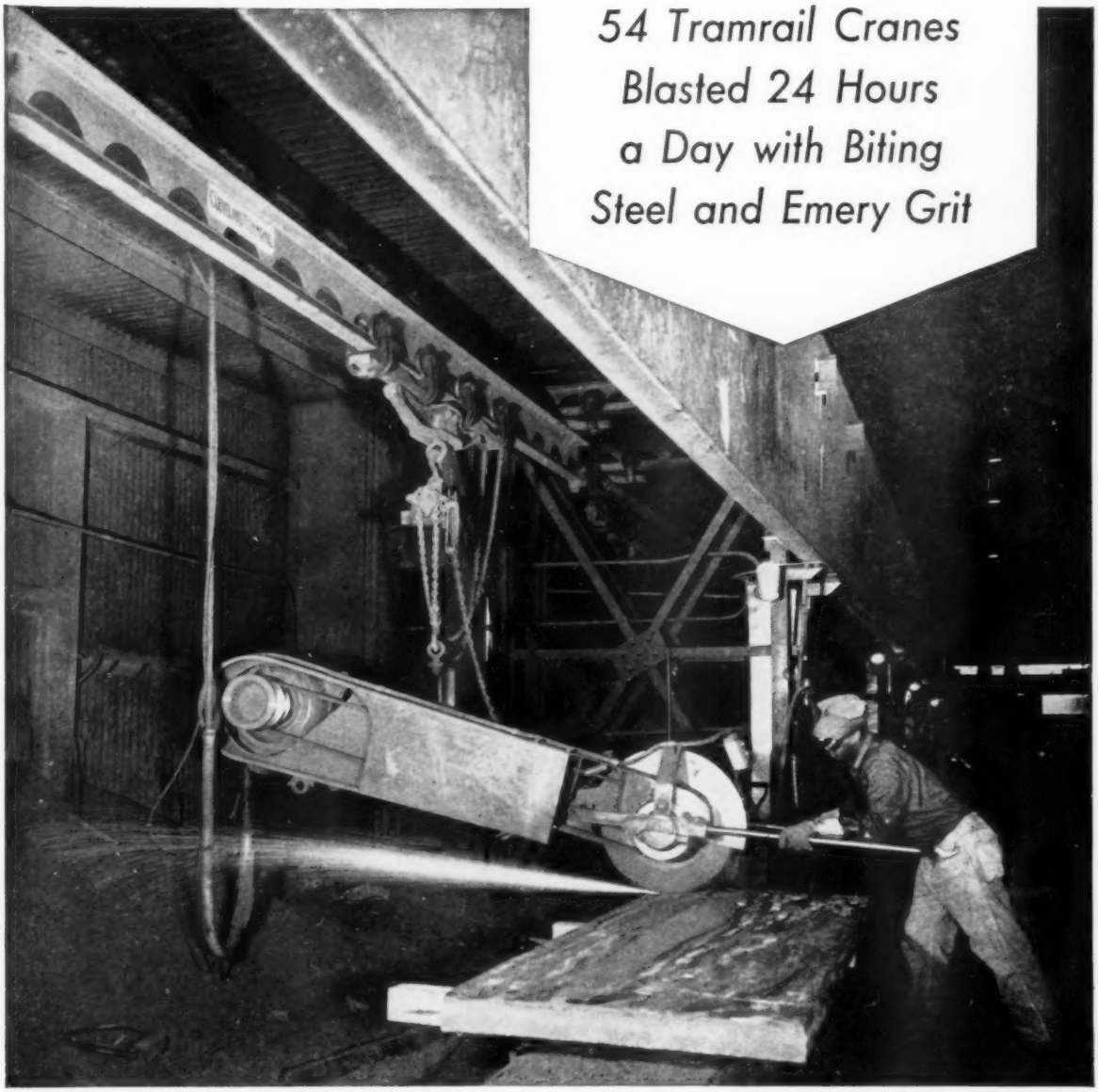
ROLLING STEEL DOORS, SHUTTERS AND GRILLES TO MEET EVERY REQUIREMENT

Two Mahon Power Operated Rolling Steel Doors, with movable mullion between, installed in a combination truck and railroad opening 36′-9½″ x 23′-0″ in the Fitzsimmons Manufacturing Company's Plant, Detroit, Michigan. Barton - Malow Co., General Contractors.

MAHON

For more facts circle 523 on Reply Card

Talk About *Tough* Working Conditions



54 Tramrail Cranes Blasted 24 Hours a Day with Biting Steel and Emery Grit

FOR years Cleveland Tramrail cranes have been handling swing grinders at a large Pennsylvania steel mill.

Despite the continuous storms of fine, penetrating, corrosive dust, the cranes operate with negligible maintenance.

The design and quality of Cleveland Tramrail equipment is of importance for every job, but on the tough ones like this is where these factors quickly prove their worth.

Cleveland Tramrail cranes are particularly well suited for swing grinder operation because of their free easy movement in any direction. This permits flat grinding over a wide area and avoids "dishing" of grinder wheel into the metal. Easy crane operation greatly reduces worker fatigue.

Write for free Engineering and Application Booklet No. 2008. Packed with valuable information.

CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

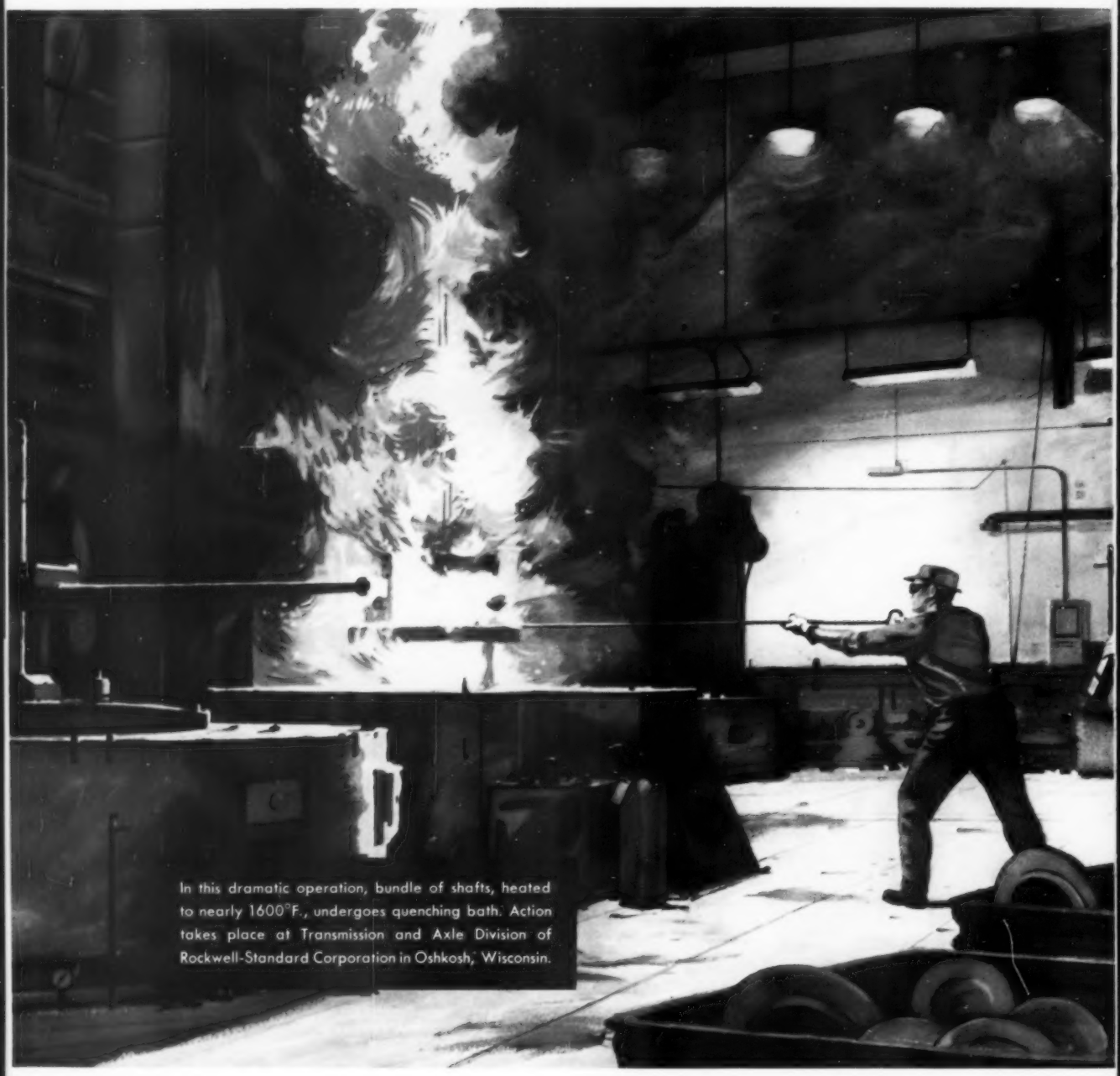
Cleveland Tramrail Division • The Cleveland Crane & Engineering Co. • 7521 East 290 Street, Wickliffe, Ohio

For more facts circle 524 on Reply Card

For more facts circle 525 on Reply Card →

Correct Lubrication in Action...

43,907 machine



In this dramatic operation, bundle of shafts, heated to nearly 1600°F., undergoes quenching bath. Action takes place at Transmission and Axle Division of Rockwell-Standard Corporation in Oshkosh, Wisconsin.

Mobil

Complete Engineering Program
Proved Petroleum Products

Mobil

SOCONY MOBIL OIL CO., INC., and Affiliates: MAGNOLIA PETROLEUM CO., GENERAL PETROLEUM CORP., MOBIL OVERSEAS OIL CO., INC.

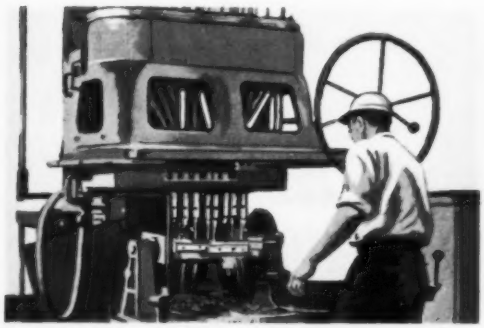
production hours saved!

In three years, Rockwell-Standard Corporation cut downtime over 36%—with the help of Mobil!

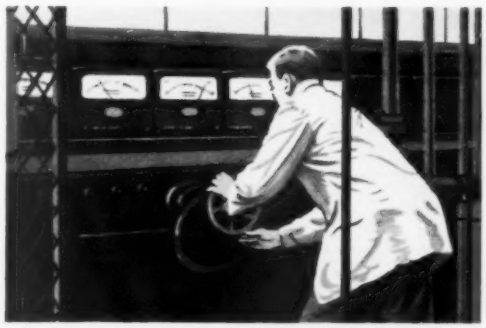
43,907 machine production hours! A worthwhile and profitable bonus. Rockwell-Standard Corporation's Transmission and Axle Division at Oshkosh, Wisconsin, made this saving through a Mobil Program of Correct Lubrication.

Plant maintenance engineers worked as a team with Mobil lubrication engineers. First, lubrication was put on a *scheduled* basis. This insured regular protection . . . cut thousands of repair hours. Oil contamination problems were solved . . . major repairs avoided. Mobil laboratories and Mobil specialists were called on for technical assistance.

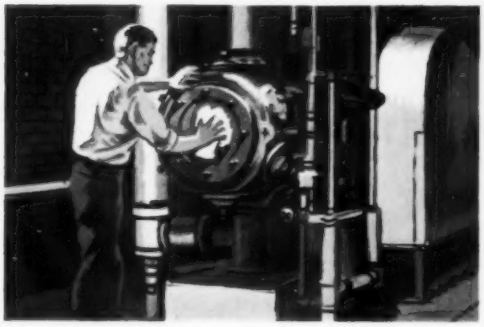
In 1957 alone, this concentrated effort to reduce maintenance costs saved $33,063. In addition, dollars gained from increased production were many times this amount. This is *Correct Lubrication in Action!* Hundreds of plants have found it the answer to improved profits. Perhaps you will, too. Why not call a Mobil engineer and find out?



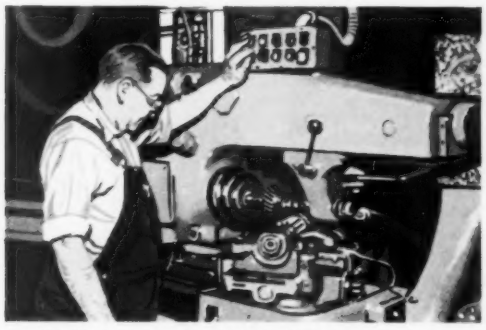
$19,520 saved on hydraulic-system maintenance. Valve failures caused severe production loss on multiple-spindle drills, boring machines and grinders. Mobil product solved problem . . . increased production by 4,000 hours per annum.



New storage and mixing tanks with automatic controls were installed as part of Mobil program. This system increased soluble-oil storage capacity . . . simplified oil purchasing . . . eliminated manual mixing of oil and water . . . saved $1,075 per year.



$3,000 air-compressor shutdown and overhaul avoided. Severe scoring was occurring in cylinder of vitally needed compressor. Mobil recommended oil that has kept compressor operating efficiently for past two years.

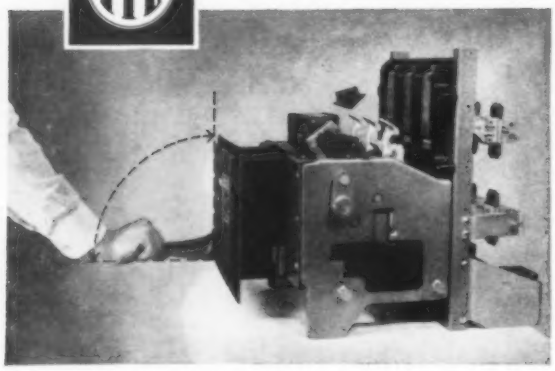


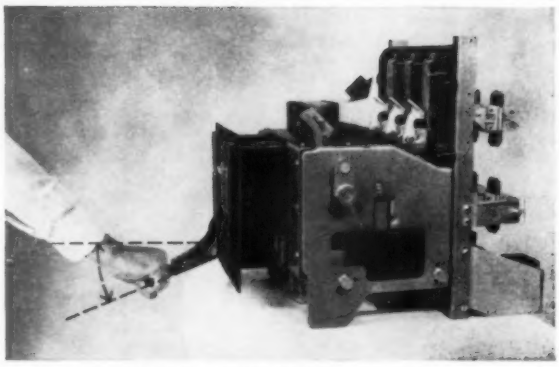
$27,225 saved on gear hobbers in 12-month period. Mobil and Rockwell-Standard personnel solved pump and fluid motor failures. New maintenance system reduced oil contamination, increased pump-motor life 400%.

Correct Lubrication

Another reason You're Miles Ahead with Mobil!

K-LINE LOW VOLTAGE SWITCHGEAR





Only I-T-E has manual quick-make operation available in 225 through 1600 amp rating

Only handle moves. Contacts are static during first 90% of pulldown handle travel. In this picture, arc chutes are removed.

Too fast for the eye. When stored energy mechanism passes crossover point, energy is released to close contacts within 5 cycles

Only I-T-E has doors closed in all positions while racking

With breaker connected. Both power and control separable contacts are engaged.

In test position. Power contacts disconnected —control contacts connected.

Completely disconnected. Both power and control contacts fully disconnected.

Quick-make, manually charged closing feature and drawout with doors closed provide maximum safety for operator and circuit breaker

You can't tease and burn the contacts of the new quick-make K-Line of circuit breakers—the closing action is fast and positive. An ingenious stored energy mechanism does the job. It stores energy in the first 90% of the pulldown handle travel, releases it in the last 10%. Not until the crossover point is reached do the contacts move. And it closes in only 5 cycles—provides uniform closure every time. *More important, it is the only manually charged stored energy circuit breaker available that will close and latch against its short-time rating.* This means greater safety for the operator, less maintenance, and longer contact life.

You don't have to open the door to move the circuit breaker to test or disconnected position. The crank which operates the simple drawout mechanism fits into the escutcheon through a lift shutter. The shutter cannot be lifted while the breaker is closed. The breaker cannot be closed while the shutter is lifted. This means more than greater safety—you can forget the dirt problem; the nuisance of open doors impeding aisle travel; the risk of circuit breaker damage from exposure, even when completely out of service.

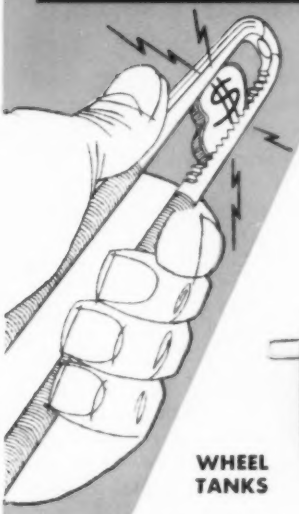
Bulletin 6004-C gives complete information about the new and safer I-T-E K-Line of low voltage switchgear. Contact your nearest I-T-E sales office for a copy. Or write Switchgear Division, I-T-E Circuit Breaker Company, 19th & Hamilton Sts., Philadelphia 30, Pa. In Canada: Eastern Power Devices Ltd., Port Credit, Ont.

I-T-E CIRCUIT BREAKER COMPANY

PHILADELPHIA, PENNSYLVANIA

For more facts circle 526 on Reply Card

IT COSTS LESS... where liquids are HANDLED RIGHT



IT'S SAFER

to handle flammable and other dangerous liquids with approved Bowser equipment.

IT COSTS LESS

to avoid spillage and inaccurate measurement by using Bowser equipment.

WHEEL TANKS

Equipped with Protecto-Seal fill-vent with flame arrestor to assure safety with all liquids. Pump dispenses pint, quart, half or gallon quantities.

OIL OUTFITS

Several types of dispenser units are available with pumps that measure selected quantities accurately.

OIL FILTERS

Sizes from 1 to 100 sq. ft. filter area provide down to two-micron filtration for liquids to 450 SSU. Expendable cartridges are easily replaced. Smaller sizes mount on pipeline or floor stand.

REMOTE CONTROL VALVES

Gate valves with explosionproof switches. Simultaneously control flow and pump operation from remote points. Built-in lock and "dead-man" safety features.

OUTDOOR PUMP

Rugged, UL Approved hand pump for use on drums, tanks or underground storage. Equipped for padlock protection.

HAND PUMPS

Pipeline, barrel, dispensing, refueling and skid-tank hand pumps. 10 to 20 g.p.m. Available in rotary or piston types in many models.

SAFETY PUMPS

Lift and dispense liquids from lower level tanks. Base bolts to floor.

PRODUCTS OF BOWSER RESEARCH

YOU CAN BE SURE

. . . if your operations require liquid-handling in bulk or piped systems, there are many Bowser Products in addition to these shown to assure you maximum safety and operating economy.

BOWSER

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Fort Wayne, Indiana

DATE_____

☐ Please send data and prices.

COMPANY_____

NAME_____

ADDRESS_____

CITY_____ STATE_____

For more facts circle 527 on Reply Card

PLANT ENGINEERS' DIGEST—so those who rush may read and know what's new

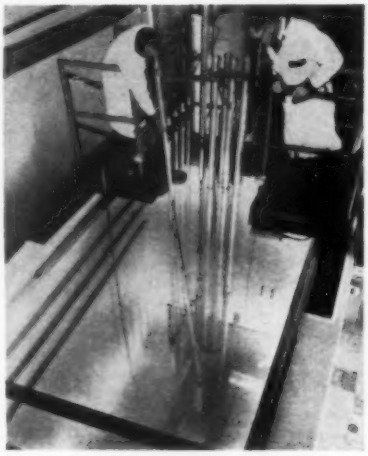
Edited by Marjorie E. Weissman

Experimental Reactor Will Provide Data for Industry

A NEW RESEARCH reactor that will provide industry with a means of determining accurately how reactor cores will behave at high operating temperatures, will mean that reactor behavior for these conditions will no longer have to be based on experiments at room temperatures.

The reactor is operated at a nominal power of 10 kw and serves primarily as a neutron source for tests, including neutron beam experiments, reactivity testing and nuclear quality control of materials.

Core of the reactor consists of an upright assembly of 16 plate-type fuel elements of uranium alloy containing 30 per cent by weight of enriched uranium.



Partly assembled reactor core rests under water in new experimental reactor.

During test operations, a subcritical assembly of fuel rods is placed in what is essentially a pressure vessel, together with wires which record the neutron distribution along the axis of the fuel rods. The vessel is then filled with water.

An external heater and pressurizer produce operating conditions up to 500 F and 720 psi pressure. The adjacent reactor serves as a neutron source for the test assembly.

After the wires have been exposed to neutron bombardment, they are removed and their radioactivity is measured by a scintillation detector. These impulses are translated by a digital printer to either tape or an IBM card punch system. Reactor operating test conditions are thus automatically classified for subsequent analysis. *From a release of Babcock and Wilcox Company, New York, N. Y.*

"Water Table" Aids Study of Air Flow Patterns Obtained in Ducts

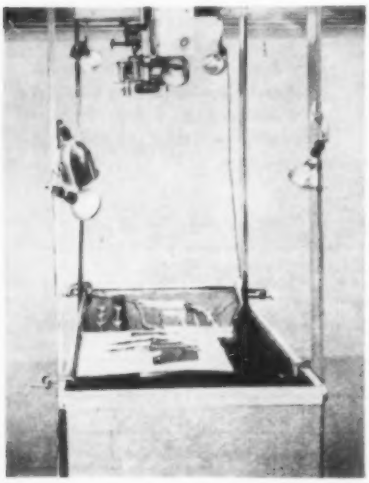
"WATER TABLE" test procedure for studying the effects of inlet and outlet duct arrangements on air flow patterns within electric precipitators, has been developed by our engineers.

Before adapting the water table to general use, tests were conducted to try to correlate water flow patterns with air flow patterns obtained in an actual duct. Results were sufficiently close to indicate that the water table data were reliable.

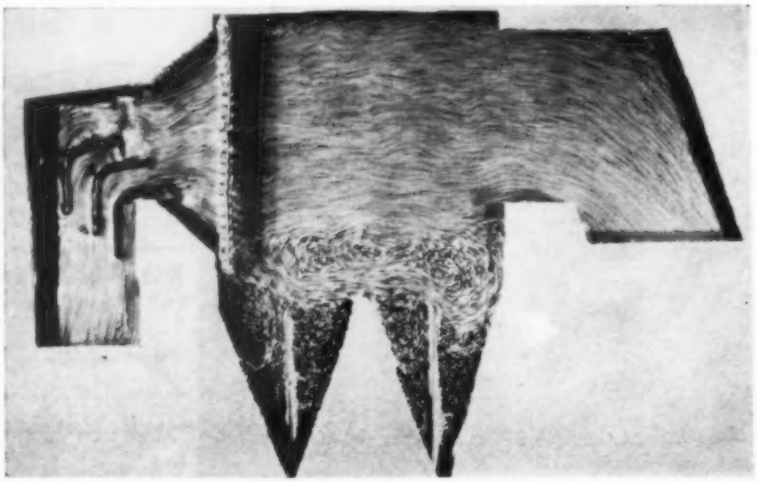
The water table is 3 ft by 5 ft by 5 in. deep, with a water inlet at one end and an outlet at the other. Discharged water is collected in a tank located under the table and is recirculated by a ¾-hp pump. Various arrangements of baffles and vanes are used to change flow pattern.

Velocity is controlled by a valve in the 1-in. inlet pipe and this valve is generally completely

(Continued on page 40)



Water table, with camera suspended.



Satisfactory flow pattern is obtained with arrangement of baffles and vanes

Up to 163 Degree Spread — Up to 236,000 Candlepower: Now in

New CROUSE-HINDS Mercury Floodlights

Plus 6 Outstanding Advantages Never Before Offered in Mercury Floodlights of this Wattage

New—700 to 1,000 watt mercury floodlights with the widest beam-spread on the market . . . up to 163°. Or the brightest . . . 236,000 candlepower concentrated in a 75° solid angle! Complete with ballasted assemblies that will start lamps at −30° F. offering a further choice of three different reflectors and four different lenses (including a spun-sealed plate glass lens) to adjust the beam-spreads and candlepowers to your particular needs. All using either clear lamps for brightness, or phosphor-coated lamps for color enhancement. And all offering rear-door relamping and positive locking in open position.

Mercury Floodlighting Is Here to Stay

No other floodlight lamp approaches mercury for long burning hours . . . for economy of cost and labor in relamping. And no other mercury floodlight approaches these new MVF's for convenience of relamping, aiming, utilization factor and maintenance of output over a long period of burning. Other lights in the Crouse-Hinds range of floodlights from 250 to 700 watts provide varying beam spreads, intensities and efficiencies.

✱ For assistance in computing the exact fixtures, wattages and footcandles for your needs, consult your Crouse-Hinds distributor or the Illumination Department at the Factory.

CROUSE HINDS

MAIN OFFICE AND FACTORY: SYRACUSE, NEW YORK
Crouse-Hinds Company of Canada, Ltd., Toronto, Ont.
Crouse-Hinds Instrument Company, Inc., Silver Spring, Maryland

• CONDULET® ELECTRICAL EQUIPMENT (Explosion-Proof and Conventional) • FLOODLIGHTING
• TRAFFIC CONTROL SYSTEMS • AIRPORT LIGHTING and WEATHER MEASURING EQUIPMENT •

These products are sold exclusively through electrical distributors. For application engineering help, contact one of the following offices: Atlanta Baton Rouge Birmingham Boston Buffalo Chicago Cincinnati Cleveland Corpus Christi Dallas Denver Detroit Houston Indianapolis Kansas City Los Angeles Milwaukee New Orleans New York Omaha Philadelphia Pittsburgh Portland, Ore. St. Louis St. Paul Salt Lake City San Francisco Seattle Tulsa Washington Resident Representatives: Albany Baltimore Charlotte Chattanooga Reading, Pa. Richmond, Va.

For more facts circle 528 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

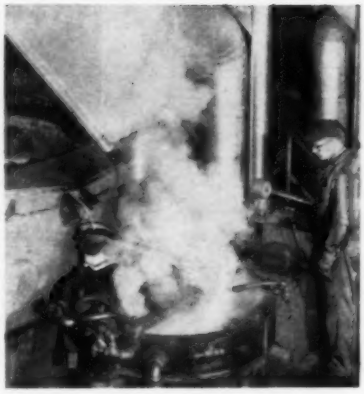
open. Changes in velocity do not greatly affect the flow pattern but sometimes it is desirable to study the pattern in slow motion.

Strips of metal two to three inches high, are arranged on the table to form a cross section of the precipitation, to scale of ½ in. or 1 in. to the foot. The cross section generally represents a vertical plane parallel to the flow through the precipitator.

So far, the best method found to observe the flow of water, is to dye the water blue with ordinary bluing, then sprinkle it at the inlet with aluminum powder. This creats an effective pattern indicating flow characteristics. Motion pictures are taken of the various arrangements tried in solving a particular problem. Also, time exposures are taken to indicate results of these arrangements. *From a release of Buell Engineering Co., Inc., New York, N. Y.*

Semi-Continuous Casting For Copper Alloys

CASTING EQUIPMENT, for both extrusion billets and rolling mill slabs using the semi-continuous casting process, is in use with copper alloys at the Ansonia Div. of The American Brass Company.



Semi-continuous casting of alloy slabs.

The installation comprises a series of casting machines each fed with liquid metal from electric induction furnaces. The liquid metal flows from the furnace spout along a launder, to a distributor and then into the molds. The metal is cooled rapidly in passing through the water-jacketed "bottomless" molds and is solid by the time it leaves them. The molds are continuously filled with molten metal to match the withdrawal of the solidified castings until the ingots have been cast to their desired length.

Machines at Ansonia are used to produce multiple-strand extrusion billets up to 8-in. diam and rolling mill slabs up to 6 in. by 24½ in., in lengths up to 12 ft.

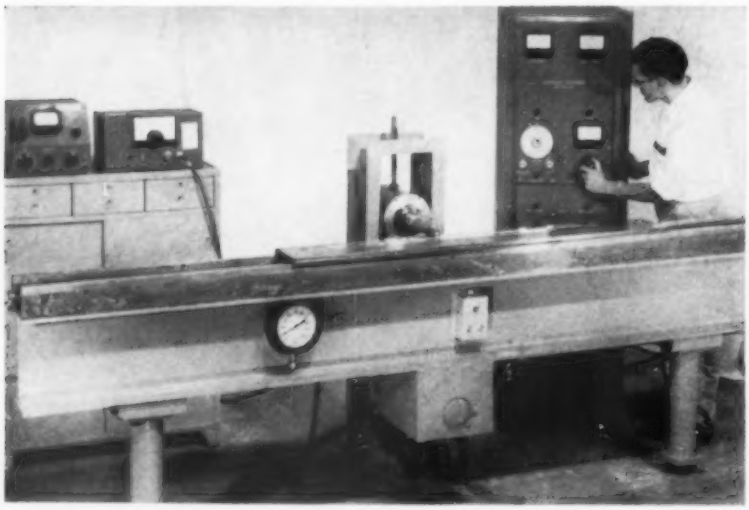
Each station has its own hydraulic power unit which allows the speed of casting and the length of stroke of the hydraulic ram to be carefully controlled. Only one operator is required per machine, with a helper assisting at the start of casting and at the final removal of the billets or slabs by overhead crane. *From a release of Lobeck Casting Processes Incorporated, New York, N. Y.*

Continuous Ultrasonic Welding For Aluminum Components

FOR MORE than three years, aluminum spiral ribs have been continuously welded to tubes more than 15 ft long, using a series of overlapping, spot-type welds, made ultrasonically.

These assemblies were fabricated in a machine more than 35 ft long which was completely automated, including indexing of the tube, locating the rib, spacing the spot welds and complete cycling of the welding operation. Once the operator started the machine, the rib-tube assembly was welded without further effort by the operator.

A continuous, ultrasonic roller-type seam welder, wherein the work passes under the ultrasonic welding tip which rotates and supplies power without interruption, is also in use. This welder makes a continuous rather than a stitch-type weld. The equipment is automatically controlled, including the complete cycle of starting by a foot pedal, traversing the length of the weld, shutting off power and returning to the starting point to receive the next workpiece. *From a release of Aeroprojects Incorporated, West Chester, Pa.*



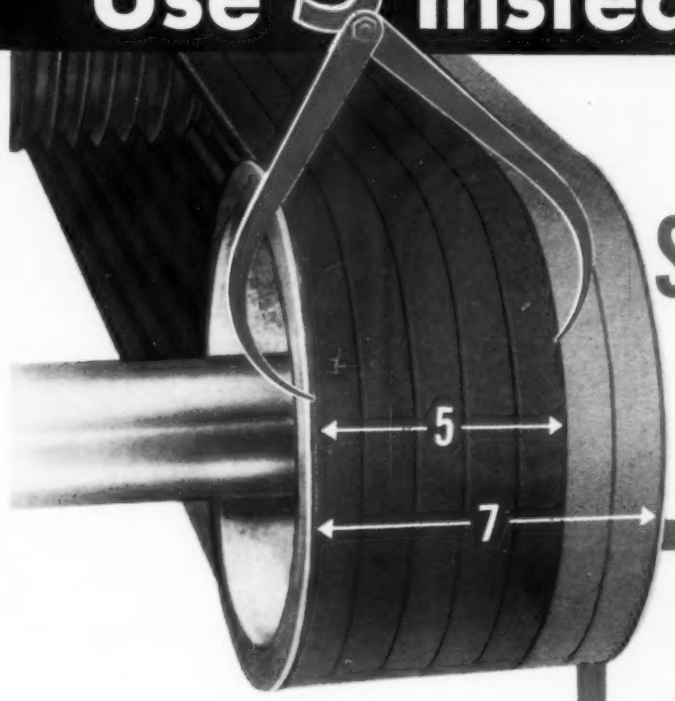
Work passes under rotating tip which delivers uninterrupted power to weld zone.

Model Parts

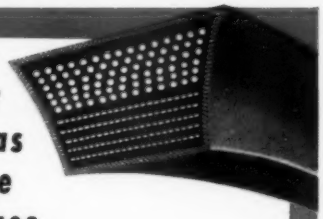
PLASTIC MODELS of parts requiring multiple drilling operations are made at Moore Products, Philadelphia, Pa., to provide a quick, accurate means of checking tool setups. Many of the parts require the use of more than 100 drill press spindles. They are set up as many as 24 at a time on a drill press production line.

The models are also used for

Use 5 instead of 7...



save { space / weight / cost



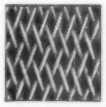
No other V-Belt has ALL these advantages

Money-saving fact: **A Gates Super Vulco Rope Drive delivers more HP per dollar invested than *any* standard V-belt drive.**

By using belts with 40% more horsepower capacity, you reduce sheave width and weight — save substantially in overall costs.

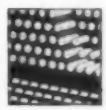
A wealth of drive data is always quickly available to you. Whether you need drive design service — or V-belts — or sheaves — just call your nearby Gates Distributor for a Gates V-Belt specialist.

Stocks carried in industrial centers throughout the world.



1. Flex-Weave Cover (U.S. Pat. 2519590)
A Gates exclusive: provides greater flexibility with far less stress on fabric. Cover wears longer . . . increases belt life . . . more power available to driven machine.

2. Concave Sidewalls (U.S. Pat. 1813698)
Concave sides (Fig. 1) increase belt life. As belt bends, concave sidewalls become straight, making uniform contact with sheave groove (Fig. 1A). Uniform contact means less wear on sides of belt . . . far longer belt life.



3. Tough, resilient Tensile Cords
Super-strong resilient tensile cords provide 40% greater horsepower capacity . . . easily absorb heavy shock loads . . . reduce number of belts required . . . save weight and space.

4. High Electrical Conductivity
Built into Gates Super Vulco Ropes for safer drives (in explosive atmospheres).

5. Oil, Heat, Weather Resistant
Special rubber compounds make Super Vulco Ropes highly resistant to heat, oil, and prolonged exposure to weather.

TPA 341

Gates Distributors are in the Yellow Pages

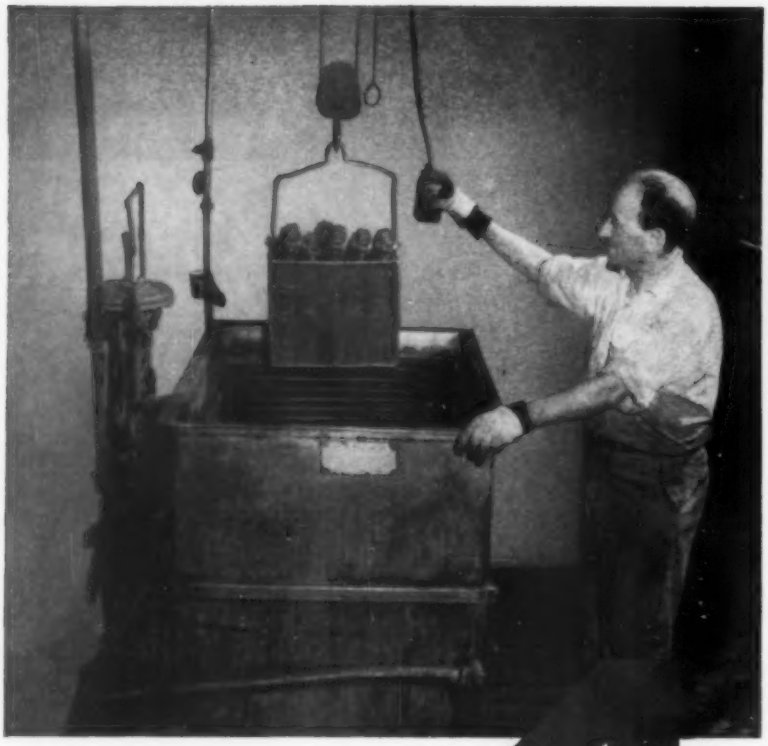
The Gates Rubber Company
Denver, Colorado
World's Largest Maker of V-Belts

Gates — The Mark of *Specialized* Research

Gates Super Vulco Rope Drives

40% more Horsepower Capacity

For more facts circle 529 on Reply Card



degreasing compounds last up to 4 TIMES LONGER with a **PUROLATOR** filter

You'll spend up to 60% less on degreasants when you filter them with a Purolator filter. The filter traps most of the contaminants, so the compound lasts up to 4 times longer. You just change the filter instead of changing the compound—much easier and much cheaper.

The compounds stay like new longer because the filter picks up the contaminants as soon as they appear, prevents them from cutting down on degreasing efficiency.

Original installation of the filter is simple, too. The motor and pump that circulate the degreasing fluid will also pump the compounds through the filter.

This is just one of the ways Purolator can help reduce operating costs and improve product quality. For further details contact your nearest Purolator Industrial Sales Agent, or the Purolator Industrial Sales Division, Rahway, N. J. PF-2-113.

Filtration For Every Known Fluid

PUROLATOR

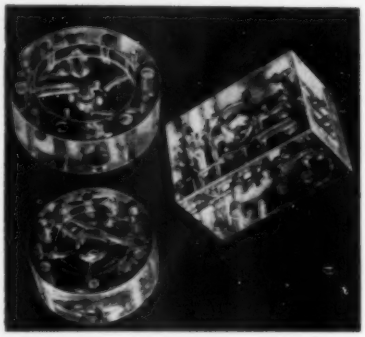
PRODUCTS, INC.

RAHWAY, NEW JERSEY AND TORONTO, ONTARIO, CANADA

For more facts circle 530 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 38)



Plastic models are used to check tool setup accuracy and instruct operators.

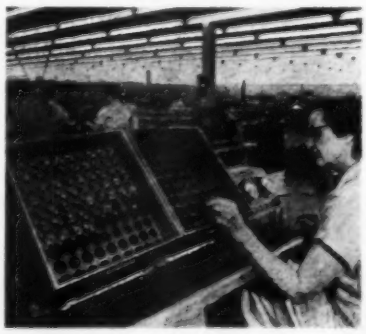
instructing workers in the operations to be performed at each work station. *From a release of Walker-Turner Div., Rockwell Mfg. Co., East Plainfield, N. J.*

Handling Electronic Components

CARDBOARD BOXES formerly used to transport electronic relay components, had a short service life and provided little protection to parts in transit, at C. P. Clare & Co., Chicago, Ill. Wooden trays also were found unsuitable as they were too heavy for women and handicapped workers to handle and presented a splinter problem.

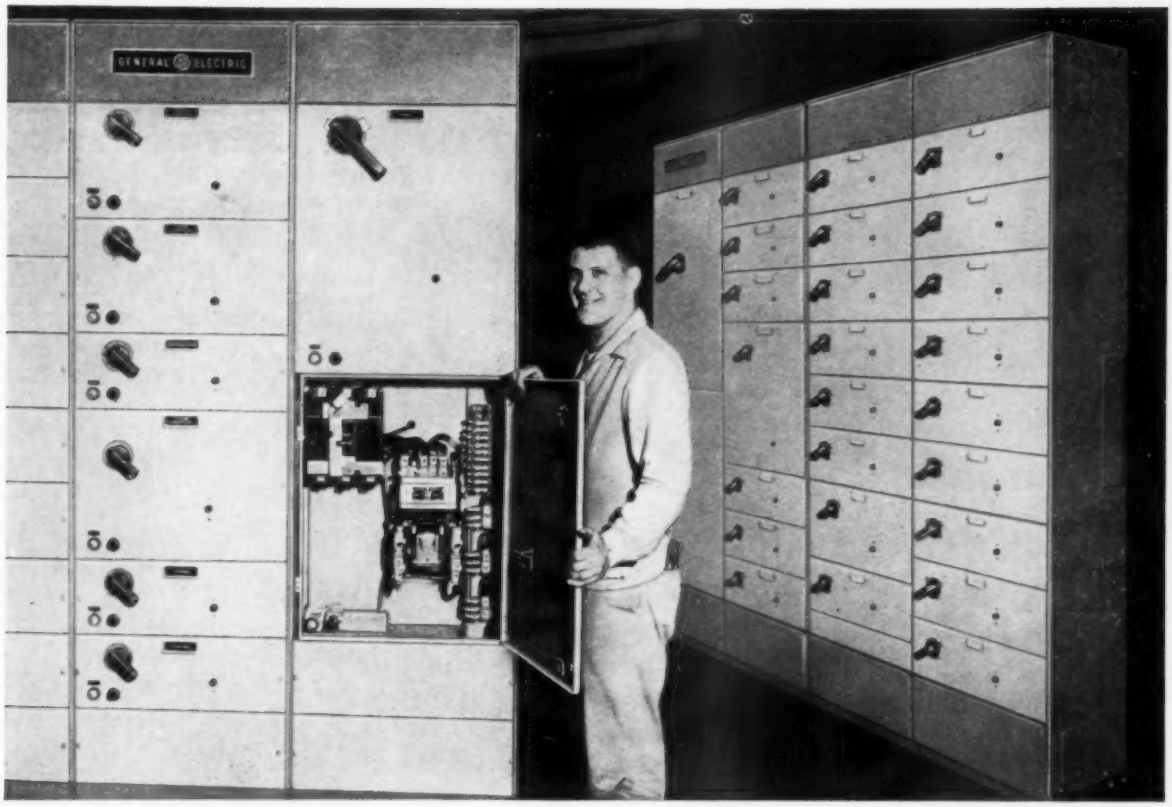
In seeking a solution to these problems, the company tried vulcanized fiber containers. Several hundred standard and special containers in a variety of sizes are now being used.

Each container has a built-in fiber shelf with holes to accom-



Vulcanized fiber boxes are used to hold relay assemblies, can be tilted while being used for workholder at bench.

New idea offers more for the money...



New G-E Motor Control Center costs less, saves space, expands easily, needs less maintenance

General Electric's new Type DA7093 Motor Control Center controls and protects a-c motors, 200 hp, 110 to 600 volts. It is designed as one neat, compact package that saves up to 50% of floor space and takes the "cramp" out of installations where space is limited. (Each standard vertical section is 24" wide, 13½" deep and 90" high and will accommodate up to nine size 1 or six size 2 plug-in units.)

More than a space-saver, however, Type DA7093 boasts several advances of specific interest to consulting engineers and industrial users:

- **Costs less installed** than other control centers and less than individually mounted devices. Wiring is simpler and faster and the compact design of the "'93" can reduce required building floor area 20 to 25 square feet, saving $400 to $700 per installation when all items — lower construction costs, overhead, future taxes, insurance, etc.—are considered.
- **Flexible.** Standard plug-in control units in NEMA sizes 1 through 5 can be added, replaced or interchanged at any time in the field with minimum labor. Plug-in method cuts down-time and saves substantially in maintenance costs. Complete sections can be added quickly, easily.
- **Operates efficiently.** Bus bars are silver-plated for positive electrical contact. Standard ratings of main bus are 600 or 1200 amperes. Bus bars are mounted edgewise for optimum short-circuit strength of 25,000 or 50,000 amperes.
- **Pleasing appearance.** Clean, compact lines and two-tone color help give completed job a neat, professionally finished appearance.

For complete data, ask your G-E distributor or representative for bulletin GEA-6367A. Or write to **Distribution Assemblies Department, General Electric Co., Plainville, Conn.**

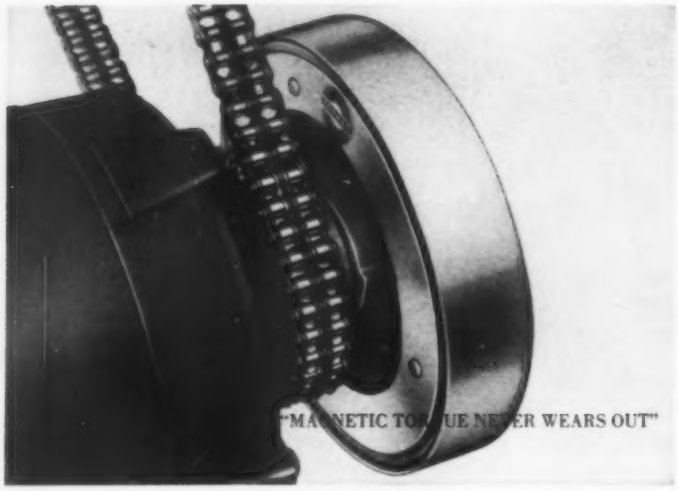
MOTOR CONTROL EXTRA VALUE

Split-type B terminal blocks permit quick, easy insertion or removal of control units. One-half of terminal block is secured to vertical section; the other half to unit frame. Lap-type terminal connections are disengaged simply by loosening captive screws. Unit can then be withdrawn without disturbing load or control wiring.

GENERAL ELECTRIC

For more facts circle 531 on Reply Card

UNIQUE IN THE FIELD!

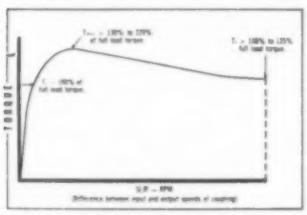


COMPLETE MOTOR DRIVE PROTECTION *with*

Whitney-TORMAG DRIVE

FULL OVERLOAD PROTECTION • CUSHIONED STARTS • HIGH EFFICIENCY • SELF-CONTAINED • TORQUE RATED • SLASHES POWER COSTS • ELIMINATES MAINTENANCE • FOR DIRECT OR POWER TAKE-OFF DRIVE •

Proven throughout industry, the new Whitney-Tormag Drive is a frictionless, permanent magnet-type power transfer unit, which insures against motor burn-outs and costly down time. Now available in 1, 2, 3 & 5 H.P. (at 1750 RPM input) sizes, ready for quick installation. Additional sizes up to 15 H.P. will follow. Torque ranges—2 ft. lbs. to 45 ft. lbs.



EXCLUSIVE OVERLOAD PROTECTION!

Operating curve illustrates fixed characteristics for optimum performance.

See These Cost Cutting Features

- Runs at full stall (100% slip) without harm to motor or driven element.
- No power loss in fluids, particles or seal friction . . . no pumps, coolers or exciters to cause power drain.
- Meets new N.E.M.A. frame specifications — compact, ready to install in minutes.
- Slip start design allows use of lower H.P. motors—cuts motor, starter and power costs.
- Cushioned starts eliminate shock, reduce maintenance costs.
- Operates from minus 60° F. to 150° F.

Available from stock through your Whitney Chain Distributor.

A Product of **Whitney CHAIN COMPANY**

301F Hamilton Street
Hartford 2, Connecticut

ROLLER CHAIN • CONVEYOR CHAIN • SPROCKETS • FLEXIBLE COUPLINGS • WHITNEY-TORMAG DRIVES

For more facts circle 532 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

modate 100 relays, thus providing an automatic counting system that aids inventory control, for more than 40 basic types of relays and switches. The boxes are easily lifted by women workers and can be stacked up to five high without danger of toppling or crushing. Equipped with hardwood runners, the containers can be moved easily along assembly tables and, because they hold the relay assemblies in correct position at all times, they can be tilted and used as working containers. *From a release of National Vulcanized Fibre Company, Wilmington, Del.*

Flare Loses Its Flame

INSIDE A 12-ft diam, 35-ft high stack, a new, smokeless oil refinery flare has recently completed

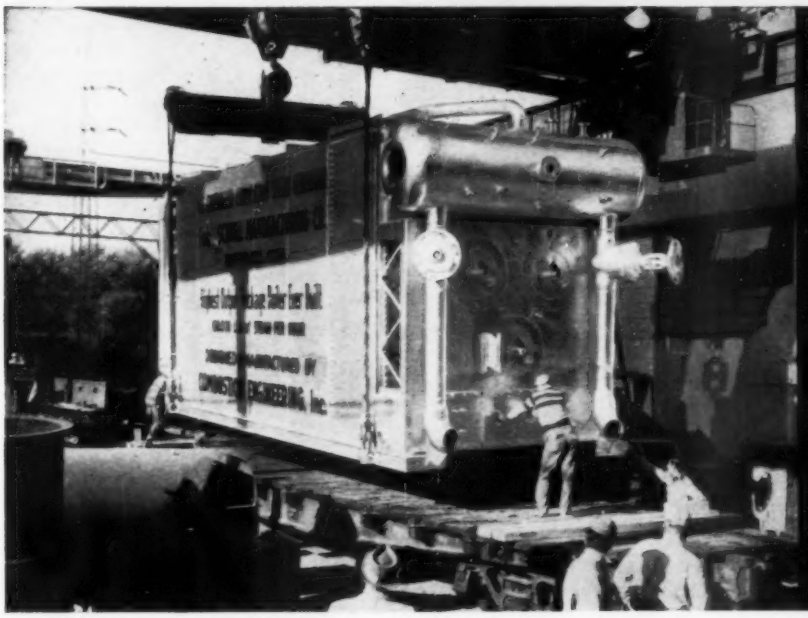
Smokeless oil refinery flare has proved highly successful in two-year tests.

approximately two years of testing at the Imperial Oil refinery at Halifax, N. S. It was designed by Esso Research and Engineering Co.

Several parallel pipes, each containing a row of small nozzles discharging vertically, are inside the stack. Just above and parallel

Announcing

THE C-E CONTROLLED CIRCULATION PACKAGE BOILER...Type PCC



A NEW HIGH PERFORMANCE DESIGN OFFERING

• Capacities to to 100,000 lb per hr

• Pressures to 1,000 psi

• Temperatures to 900 F.

Another Combustion first in the boiler field — the type PCC package unit, utilizing controlled circulation. This one, being loaded at our St. Louis shops for delivery to Scovill Manufacturing Co., is the world's highest output package boiler, having a design capacity of 100,000 lb of steam per hr. This picture illustrates the ease with which this new, high performance design can be readied for shipment. Its size permits transfer from railway siding to destination by truck.

Available for the first time to industrial steam users is C-E's famous controlled circulation design in a convenient package size. The oil- or gas-fired PCC offers capacities from 80,000 to 100,000 lb per hr, pressures from 450 to 1000 psi, and temperatures to 900 F. Higher pressures and temperatures are obtainable if desired.

Seven PCC boilers are now in service. One of these is a special-purpose design for steam conditions of 1500 psi and 1050 F.

The PCC is especially suitable where space is limited, yet high capacity, temperature, and pressure are required. It is only through the use of controlled circulation that such a compact, high-performance unit could be built. This exclusive C-E design assures positive distribution and control of water to all circuits, permitting the PCC to be placed on the line faster than any natural circulation boiler. It also allows easy handling of rapid load swings with high quality steam production.

Not only does the PCC combine outstanding performance in a unit requiring less space per pound of steam, but also it offers the inherent advantages of package boiler design: quality shop assembly by experts, quicker delivery, much less plant disruption for installation and, of course, cost advantages due to these features.

If your future steam requirements call for a high performance boiler, it will pay you to investigate the PCC. It offers utility type boiler quality in a compact package along with the economy and reliability characteristics of C-E design.

THE PCC

Meets these industrial steam needs	with these advantages
• Power generation—with or without process steam requirements.	• Controlled circulation
• High capacity, temperature, pressure.	• Quality shop fabrication
• Maximum generating capacity in limited space.	• Ease of shipment
	• Minimum plant down-time for installation
	• Earlier delivery than possible with field erection

COMBUSTION ENGINEERING

Combustion Engineering Building **200 Madison Avenue, New York 16, N. Y.**

C-169A

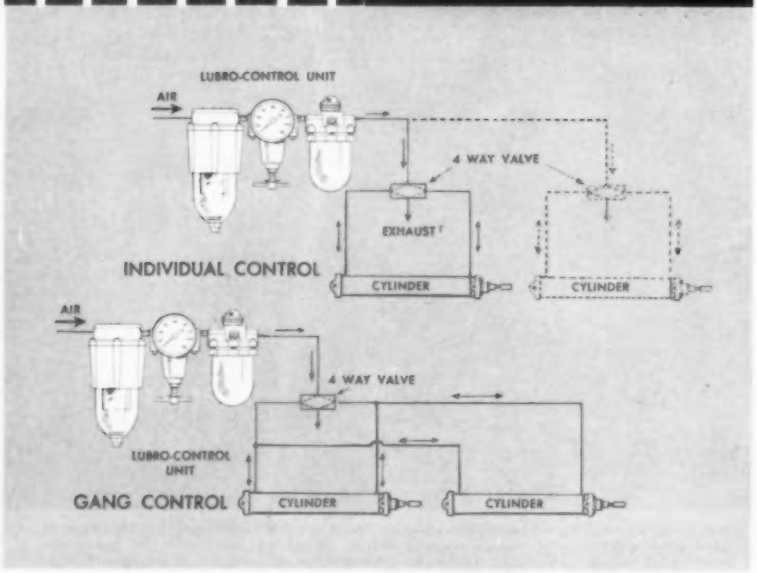
ALL TYPES OF STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT; NUCLEAR REACTORS; PAPER MILL EQUIPMENT; PULVERIZERS; FLASH DRYING SYSTEMS; PRESSURE VESSELS; SOIL PIPE

For more facts circle 533 on Reply Card

Norgren

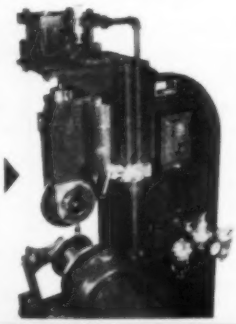
MICRO-FOG LUBRO-CONTROL UNITS

IMPROVE AIR CYLINDER PERFORMANCE



• Increased Cylinder Life
• Lower Maintenance Costs

For top cylinder performance, proper air filtration, regulation and lubrication are vital. The filter removes abrasive solids and corrosive liquids from the air and the regulator provides accurate, unvarying air pressure. Norgren MICRO-FOG, in the stream of air that powers a cylinder, provides ideal lubrication by automatically applying just the right amount of lubricant. Results: better cylinder performance, no scored cylinder walls, no damaged packing, lower maintenance and replacement costs. A single MICRO-FOG Lubro-Control Unit can provide proper compressed air processing for multiple cylinder operation.



Without the compressed air filtration, pressure regulation and lubrication provided by the Norgren unit, it would be impossible to get the close control needed in the operation of this pipe cutting machine.

If it's Norgren...It's Dependable.

For complete information, call your nearby Norgren Representative ...or WRITE FOR DESCRIPTIVE LITERATURE

C. A. NORGREN CO.

3443 South Elati Street • Englewood, Colorado

For more facts circle 534 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

to each burner pipe are solid rods of refractory material. The gases from the burners blast against these rods and mix with just enough air before reaching the ignition zone to give smokeless combustion. Concealed inside the stack, the new flares are not visible while operating.

The test installation has proved so successful that similar installations will be built into new refineries. It is also being considered for application to existing refinery installations. *From Oilways, published by Esso Standard Oil Co., New York, N. Y.*

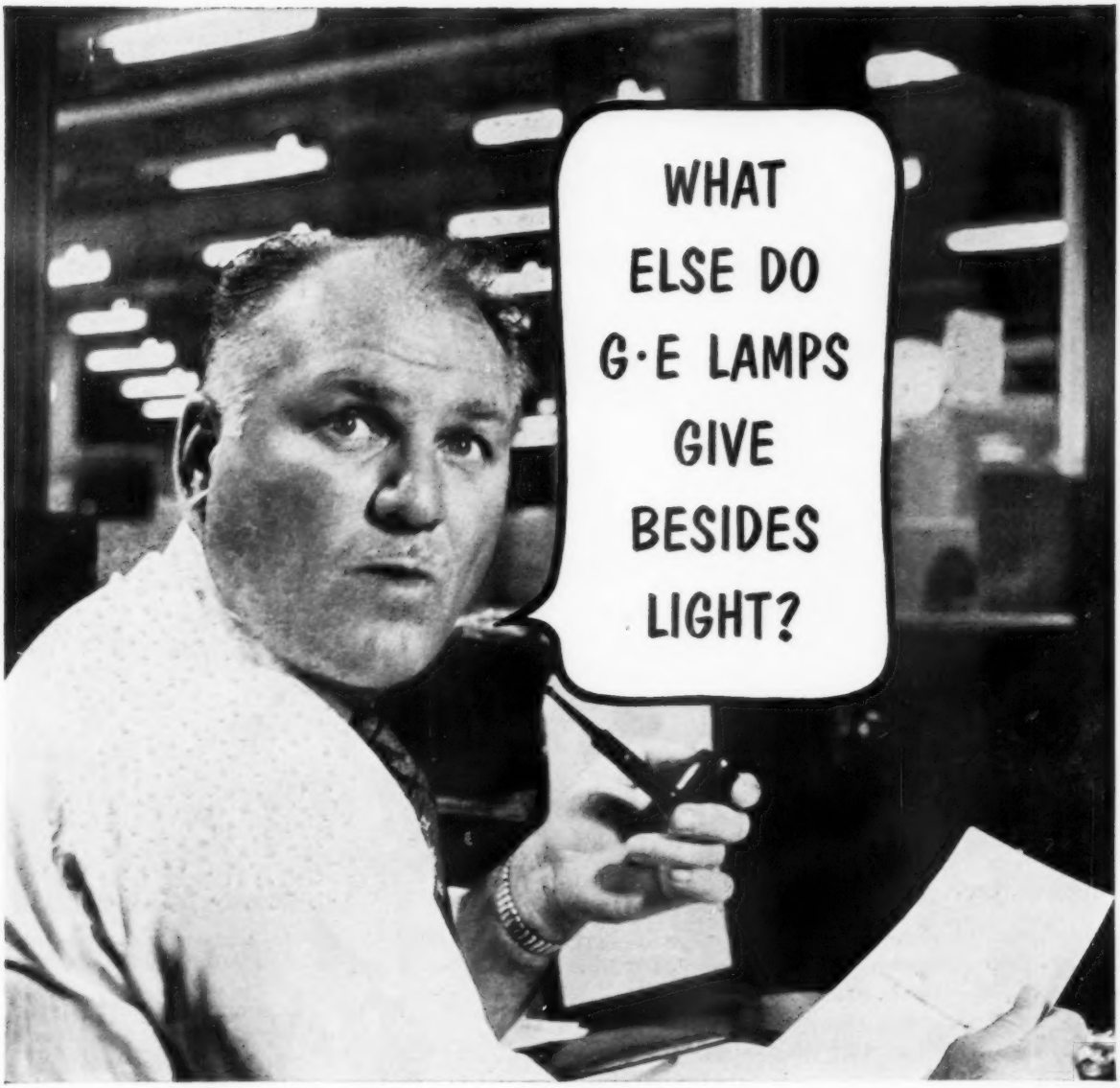
Stainless Water Screens

Stainless steel water screens, designed by Ohio Drilling Co., to resist corrosion and clogging, are lowered into water well. (From a release of Republic Steel Corp., Alloy Steel Div., Massillon, O.)

Steam Jet Cuts Cleaning Time Spent on Grills and Screens

BY USING HIGH-PRESSURE, hydraulic jet cleaning, American Cyanamid Co. realizes a substantial savings in cleaning ball mill accessory equipment at the company's Bound Brook, N. J. plant. Former hand cleaning methods meant the possibility of color contamination.

Absolute cleanliness is essential in the department where thermosetting plastic compounds are produced in more than 6000 colors, because any carry-over of material



IF you use G-E Lamps you get *lots* more. General Electric's staff of nearly 500 lamp specialists and engineers are ready to help General Electric Lamp users.

1. Spotlight A Building Or Use Black Light On Outdoor Signs. G-E specialists will help work out solutions for all kinds of specific lighting jobs . . . as well as help plan new lighting systems and relighting of existing buildings.

2. Work Faster, Work Closer. The right inspection lighting is paying off in places like tool shops, textile mills and the like.

3. See Colors As They Really Are. G-E engineers can suggest lighting especially designed to improve color rendition—ideal for stores, art and photo studios.

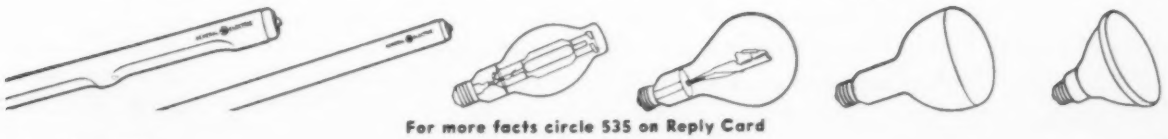
4. Cut Maintenance Costs. Your General Electric specialist will help work out the right lighting maintenance program for your plant, office or store.

5. The Right Lamp At The Right Time. To insure fastest ordering and delivery service General Electric consigns lamps to your local supplier—and backs him up with over 20 million lamps in warehouses all over the country.

See your local supplier for help on how lighting can reduce accidents, cut rejects and improve "housekeeping". He'll enlist the aid of the right G-E Large Lamp Specialists. (C-843)

Progress Is Our Most Important Product

GENERAL ELECTRIC



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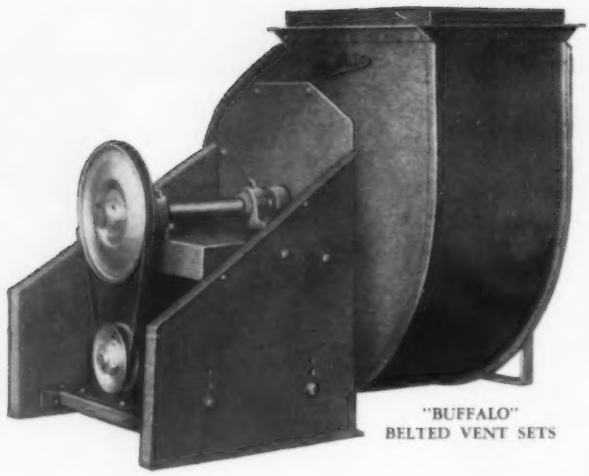


"BUFFALO"
BELTED VENT SETS

SPOT THESE LOW-COST VENTILATION "PACKAGES" EXACTLY WHERE NEEDED

"Buffalo" Belted Vent Sets will provide your plant with quiet, efficient, economical ventilation — *where you need it — to the exact degree required.* These *flexible* ventilating "packages" enjoy wide use in a number of industrial applications, large and small.

"Buffalo" Belted Vent Sets are ideally suited for smaller, independent plant systems. They meet the need for larger systems with expanding or variable requirements. They are readily adaptable to separate systems located in various parts of the plant.

These easy-to-install package units are unusually quiet and highly efficient, because they bring you all the outstanding engineering features developed during the 81 years of "Buffalo" fan engineering experience. These include patented, double-curved blade, non-overloading, factory-balanced wheels and correctly-designed inlet vanes. The result is stable fan performance over the entire operating range. Adjustable pitch motor sheaves permit capacity changes to meet future requirements.

Capacities range from 500 to 20,000 cfm. All-weather drive cover is available for outdoor installations. Special protective coatings and fume hood exhauster can be specified. These units can also be adapted for induced draft service to handle gases up to 600° F.

Ask your nearby "Buffalo" engineering representative about the many advantages of "Buffalo" Belted Vent Sets or write for Bulletin 3720-A.

"Buffalo"

BUFFALO FORGE COMPANY
166 Mortimer • Buffalo, N. Y.

Buffalo Pumps Division, Buffalo, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.
Sales Representatives in all Principal Cities

INDUSTRIAL EXHAUSTERS • BELTED VENT SETS • PROPELLER FANS • "E" BLOWERS-EXHAUSTERS

For more facts circle 536 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

into a later batch might show up conspicuously on the surface of a finished molded piece.

To prevent contamination, ball mill grills, screens and housings, as well as cutter screens, were originally cleaned by hand, using wire brushes and hot water hose. Some of the smaller screen openings had to be cleaned out practically hole-by-hole with a piece of wire or other small tool. Some colors were particularly hard to

Jet steam cleans screens and grills without disassembly or manual brushing.

remove, requiring about an hour of a laborer's time to clean a single mill.

An additional expense was incurred because a mechanic had to be called in to disassemble the grill before cleaning operations could begin.

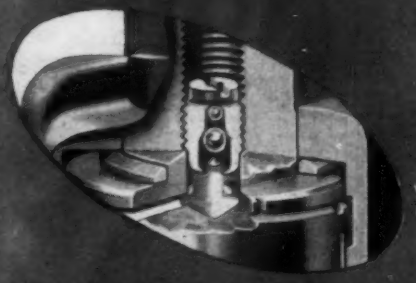
High pressure hydraulic jet cleaning was used to solve the ball mill and screen decontamination problem.

The cleaner mixes steam at pressures up to 125 psi with cold water to produce a powerful stream of hot water that blasts particles of powdered plastic out of the screens and housings.

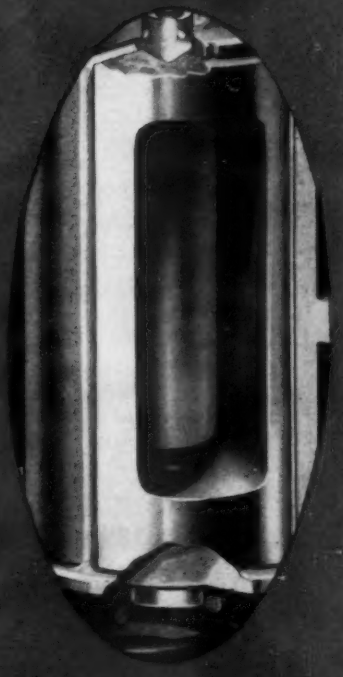
Because the jet penetrates all crevices, there is less need to disassemble the screens and grill before cleaning and downtime and the need for skilled labor are reduced. *From a release of Sellers Injector Corp., Philadelphia, Pa.*

In the spots that count...Homestead Valves are

LEAKPROOF



Reinforced Teflon and lubricant seal



Controlled pressurized lubricant seal

Lower cost per year valve service is guaranteed by Homestead Lubricated Plug Valves. These are the features that make them leakproof and extend their useful life . . . reinforced Teflon* head seal, double ball and lubricant sealed check valve, and their exclusive controlled pressurized lubricant seal.

Homestead's controlled lubricating system forces a chemical film over all sealing surfaces at more than 300 pounds pressure. In addition, it prevents sticking, by its piston-like movement of the plug during each lubrication. See how Homestead fills your valve needs. Write today for Reference Book 39, (Section 5), for complete information on Homestead Lubricated Plug Valves.

*DuPont registered trademark.

h
v

HOMESTEAD VALVE MANUFACTURING COMPANY

P. O. Box 207 • Coraopolis, Pa.

For more facts circle 537 on Reply Card

Here's a steam trap

..and for seven sound reasons:

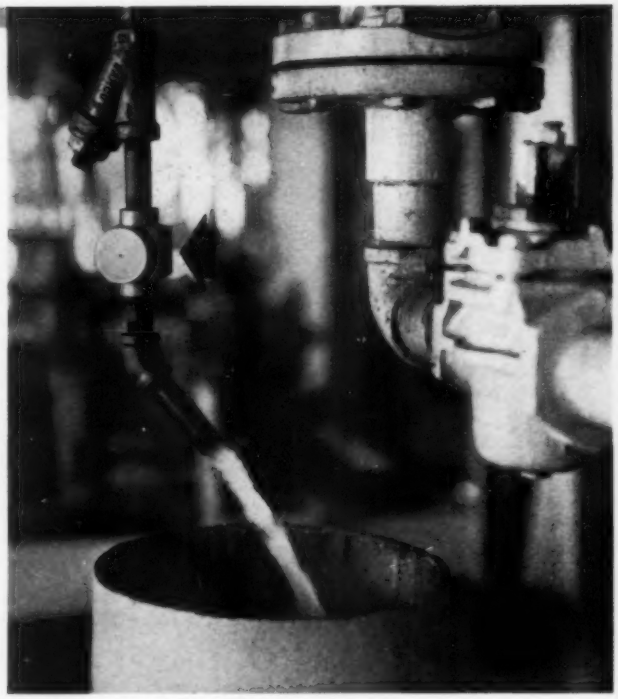
1. *Simplicity* – only one moving part.

2. *Maintenance* – practically zero. 3. *One trap* for all pressures from 10 to 600 psi.

4. *Uniform performance* – operates equally well on heavy, light, or no condensate load.

5. Operates against *back pressures* up to 50% of inlet pressure. 6. *Rugged* – unaffected by superheat, water hammer, vibration, or corrosive condensate. 7. *Minimizes inventory* of spare parts.

Sarco TD's on outdoor blending tanks of Shell Oil Company, Sewaren, New Jersey, are installed vertically, instead of in the usual horizontal position, in order to drain coils after shut-down, thus preventing freezing.



1. DRAINS AND VENTS

at start-up. Immediately rids lines of condensate and air to permit normal operation. This eliminates the need for manual opening of valves to drain the system.

CONTROL COSTS

In these days of sharp emphasis on cost control, Sarco Thermo-Dynamic TD Traps are helping plants to deliver the full productive power of every pound of steam. And because the TD has no mechanism . . . no gaskets . . . no narrow channels to clog, maintenance cost on the TD is almost nil. As one plant engineer puts it: "This TD is a cinch to install, it's no bigger than a tee fitting, and it works in any position. The TD is the one steam trap we can install and forget."

CHOOSE THE RIGHT TRAP

There's an infinite variety of applications, temperatures, pressures and loads in industrial steam piping. Sarco can help you select the right trap for every job of air and condensate removal, saving you money and down-time.

HOW ABOUT THE BUCKET TRAP?

With the development of the patented* Sarco Thermo-Dynamic Steam Trap, the bucket trap suddenly aged 50 years. In a nostalgic way we feel somewhat sorry, because *our* Sarco bucket trap has made us thousands of friends. But frankly, it's no match for the new Sarco TD. Progress is progress.

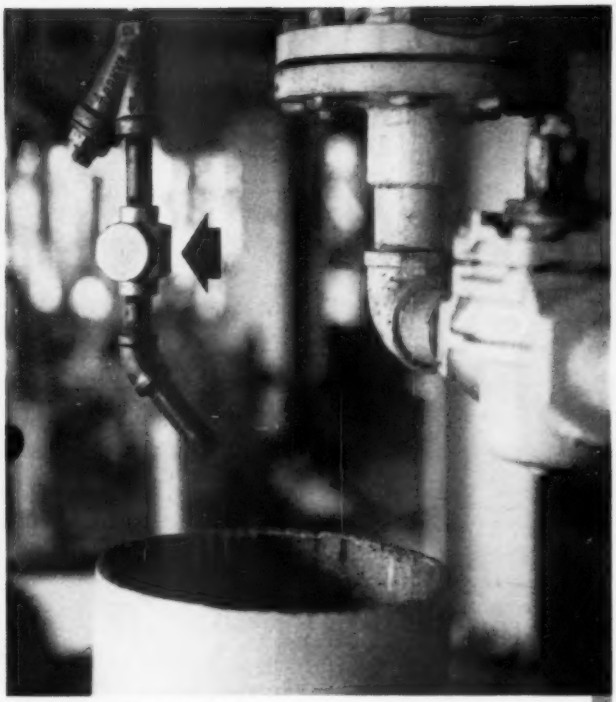
Some of our customers who are getting satisfactory service from our bucket traps may prefer to replace their old Sarco bucket traps with *new* Sarco bucket traps. If you feel this way, we're flattered enough to keep on making Sarco Bucket Traps – strong, sturdy and durable as ever. Let us suggest, however, that you at least give the new Sarco Thermo-Dynamic Steam Trap a try, under your most exacting conditions.

*U.S. Pat. No. 2,817,353 T. M. Reg. U. S. Pat. Off.

that does what a steam trap should

2. DISCHARGES

air and condensate at steam temperature as rapidly as they collect. Does not wait for a bucket of steam to leak through a small orifice.



3. CLOSES TIGHTLY

There is no continuous bleed; nor is there loss of buckets of steam as in the bucket trap which must discharge steam with each cycle.

MAINTENANCE TIME: 40 SECONDS!

How long does it take your maintenance crew to service an ordinary trap? If it's over a couple of minutes, you're throwing away valuable time. The Sarco TD can be cleaned, blown out, if necessary, and reassembled on the line, in as little as 40 seconds. 6345-B

Sarco can give you impartial advice on trap selection because Sarco makes All–5 Types:

Thermo-Dynamic . . . Thermostatic . . . Liquid Expansion . . . Float Thermostatic . . . Camlift Bucket

SARCO COMPANY, INC. 635 Madison Avenue, New York 22, N. Y.

STEAM TRAPS • TEMPERATURE CONTROLLERS • STRAINERS • HEATING SPECIALTIES

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Here's a quick way to beat construction costs—

USS Galvanized Steel Sheets

You've probably seen it happen in your own plant: Expansion is a must . . . but the construction time and cost estimates are so high that they discourage expansion plans. Not so when the plans call for a building clad with USS Galvanized Steel Sheets.

Compare prices . . . USS Galvanized Steel Sheets cost less than other types of metal roofing and siding. They are easy to put up. Once the framework is erected, it takes only a few days to cover an entire building with USS Galvanized Steel Sheets. No special construction team has to be hired. Regular construction crews or your own plant maintenance crew can do the job.

The strength of the steel and the formed pattern of the sheet make a weathertight covering that will not buckle, bulge, or sag. The building *stays* tight because bolt and nail holes in *steel* will not easily enlarge and let the sheets work themselves loose.

If you plan to build, or repair buildings at your plant, do it the quick, low-cost way with USS Galvanized Steel Sheets. They are available in a variety of sizes and patterns. Ask your steel supplier about USS "Storm Seal," USS V-5 Crimp, or USS Corrugated Galvanized Steel Sheets.

USS and "Storm Seal" are registered trademarks

United States Steel Corporation – Pittsburgh
American Steel & Wire – Cleveland
Columbia-Geneva Steel – San Francisco
Tennessee Coal & Iron – Fairfield, Alabama
United States Steel Export Company

United States Steel

For more facts circle 539 on Reply Card

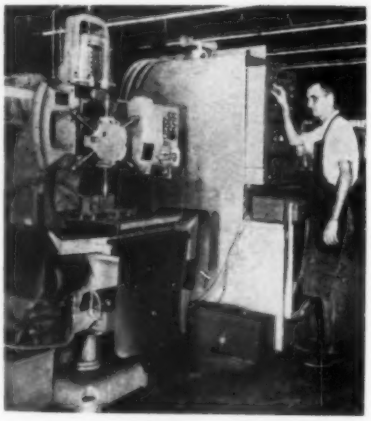
OPERATION AND PRODUCTION —pointers for the industrial plant engineer

Edited by Vern Kempf

Punched Tape Controls Drill

MANUFACTURING a wide variety of short run components, the Specialty Control Department of General Electric Company likes the savings resulting from the installation of one of their own controls on a general purpose drilling machine. Early operating data, using the low cost packaged numerical control system called "Mark II," has shown production savings ranging between 32 and 95 per cent on various jobs. Positioning accuracy of the controlled drill is better than plus or minus 0.001 inch at operating speeds of 150 inches per minute.

The machine obtains higher accuracies at lower cost and costs less to work accuracies of plus or minus 0.002 to 0.003 inch than former methods resulting in accuracies of 0.005 to 0.010 inch. Renewal parts are no longer a problem since production knowledge is now stored in the punched tape.



Operator starts machine which then automatically positions table, selects proper drill and drills into part. After all holes have been drilled, horn signals drill operator that cycle is completed.

A tape reader in the control system reads the tape, sends signals to the drill, checks the motion of the machine and when the workpiece has been properly positioned, instructs the machine to drill into the part. This sequence is repeated until all holes in the workpiece have been machined. At the end of the drilling cycle a signal is automatically set off to alert the operator that the run has been completed.

All components required are furnished as a packaged unit and consists of the main control cabinet, an operator's station, punched tape reader, two Thymotrol adjustable speed drives and two position pickup units.

Electric Kettle Heats to 700 F

INSTALLATION of a self-contained, electrically-heated kettle solved the problem of additional high-temperature grease-making capacity at the Atlantic Refining Company, Philadelphia, Pa. The company chose the self-contained unit rather than enlarge its existing Dowtherm heating system to take care of an additional conventional kettle.

The Electro-Vapor kettle, man-

(Continued on page 56)

Portable Welding Shop Reduces Maintenance Costs In Plant and Yard Work

SPECIALLY-BUILT portable welding shop has a 300-ampere Lincoln Electric belted welder and oxy-acetylene equipment mounted on a tractor for maintenance welding in Crucible Steel Company's plant, Midland, Pennsylvania. Originated by Mr. K. G. Hunt, Superintendent of Construction and Maintenance, and built by a nearby farm supply company, the tractor-welder solves many of the day to day construction and maintenance problems.

Tractor modified to carry a 300-ampere welding machine at rear and carrying oxy-acetylene equipment at front makes a portable welding shop for plant repairs.

The portable unit moves right to the job under its own power and uses the power take-off shaft to drive the welding machine. It eliminates waiting for truck conveyance, riggers, overhead crane service and electricians to connect the welder to power lines which very often are some distance from the job site. Conservative estimates indicate that a savings of $25 is made on each move of the machine.

Four units are presently operating in the plant and plans are now being formulated for the purchase of four more machines.

quickest TO ERECT

quickest TO INSTALL

quickest TO RE-ARRANGE

quickest TO PAY FOR ITSELF

DELUXE

STEEL SHELVING

quickest BECAUSE . . .

. . . you realized that a shipment of knockdown shelving parts has no useful value. It must first be assembled into shelving racks for storage utility. The faster these racks are erected, the lower your installation cost. So, because Deluxe steel shelving is erected the quickest, your *installed cost* is the lowest.

The film strip shows 6 engineering features of Deluxe steel shelving that promote quickest erection. Take the patented Deluxe boltless shelf bracket . . . it replaces 90% of the time-consuming nuts and bolts and allows not only quickest installation, but easy shelf adjustment.

THE PROOF: At 1958 trade shows, two untrained girls erected a complete closed section of Deluxe Boltless Steel Shelving in *less than 5 minutes.*

Call your local Deluxe dealer or write for the new, complete Deluxe Shelving Catalog No. 30.

Patented Boltless Shelf Bracket
Factory Built-in Shelf Reinforcing
One-piece Bin-type Upright
Snap-in Dividers (horizontal & vertical)
Clip-on Bin Fronts
Bottom Shelf Support and Floor Angle

DELUXE

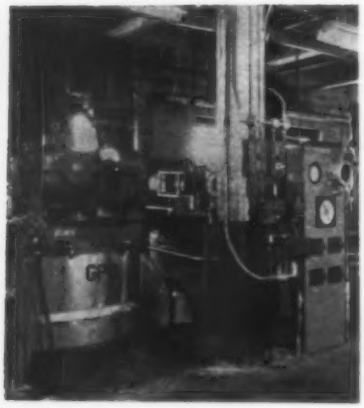
DELUXE METAL FURNITURE COMPANY · Warren 7, Pa.

A Division of the Royal Metal Manufacturing Company

For more facts circle 540 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 54)



Electricity heats Dowtherm in a reservoir formed by double-walled kettle.

ufactured by the Buflovak Equipment Division, Blaw-Knox Company, has a self-contained supply of Dowtherm and is equipped with electric immersion heaters. This is a relatively new application to the grease industry, although the same principles have been proven in numerous applications in the chemical industry.

Operating temperatures up to 700 F are possible, so a single unit can be used to make a wide variety of greases. Full heating efficiency is maintained regardless of the rate of heat input needed by the process, and there is no boiler maintenance to require periodic shutdown. Units of this type have operated continuously for periods of five years without requiring maintenance.

Accumulator Stops Roll Dropping

DAMAGE to lift trucks caused by frequent dropping of heavy paper rolls resulted in high maintenance costs at the Hankins Container Corp., Union, N. J. The most common damages experienced were broken hydraulic seals, bent mast channels, strained lifting chains,

Hydraulic accumulator, arrow, maintains pressure in clamp and lift circuits.

distorted clamps and general body damage.

Installation of hydraulic accumulators on each of three lift trucks has stopped dropping of the 2700-lb paper rolls, improved truck operating efficiency and reduced operator fatigue.

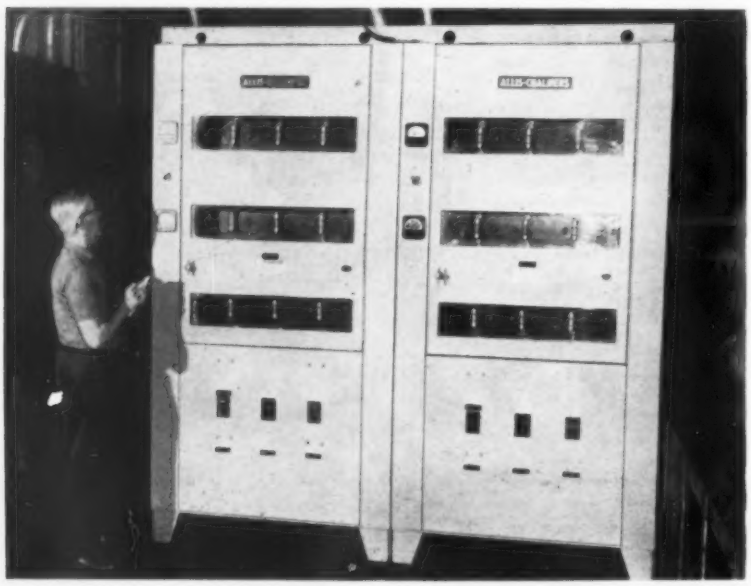
The flexible rubber bag in the steel shell of the accumulator, fur-

(Continued on page 58)

Silicon Rectifiers Replace Motor-Generator Sets—Improve Operating Efficiency

MORE EFFICIENT a-c to d-c power conversion equipment, needed at the Ford Motor Company's River Rouge Plant, was supplied by the installation of four Allis-Chalmers silicon power rectifier units. The rectifiers replaced existing motor-generator sets as the demand for d-c power in the area could be more efficiently supplied by the rectifier units.

Two of the four units are rated at 50 kw, 250 volts d-c and the other two are rated at 100 kw, 250 volts d-c. Each unit can be operated independently since each is a complete power supply in a dead front metal compartment with a-c and d-c protective equipment and all necessary auxiliary control devices. A three-phase, 60-cycle, 460-v a-c supply is used to power the units.



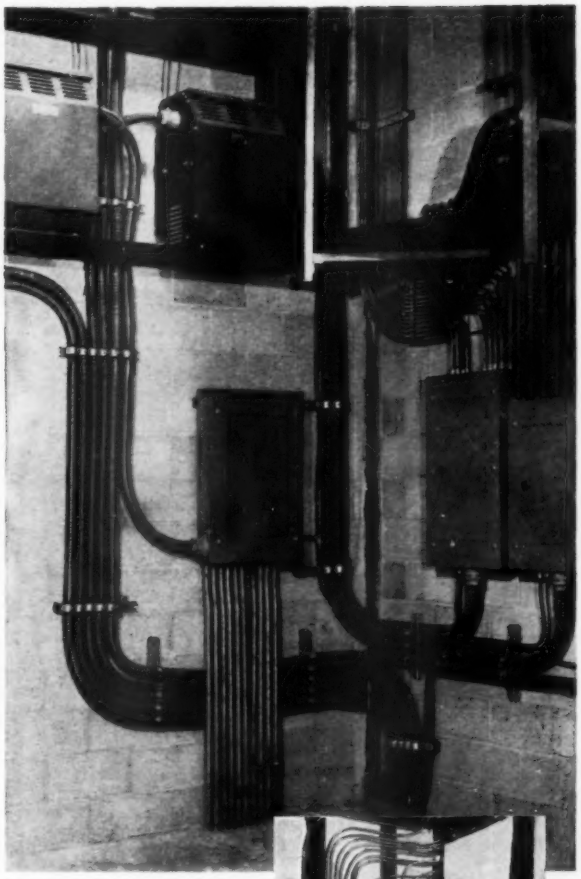
Two 100 kw, 250 v d-c silicon rectifier units for industrial plant power supply.

Rectifier fuses with failure-in dicating lights can be easily seen through the front glass panels. In case of an element failure, immediate visual indication helps to speed repairs. The silicon elements are screwed into large bus bars which serve both as electrical connection and as a heat sink to dissipate the silicon element heat losses.

Small fans at the top of the compartment furnish direct air cooling. The rectifier transformer is located in the lower rear compartment with a-c, d-c and control power breakers located on the lower front panel. Incoming a-c and outgoing d-c connections are made at the top of each unit.

the right combination for industrial power needs!

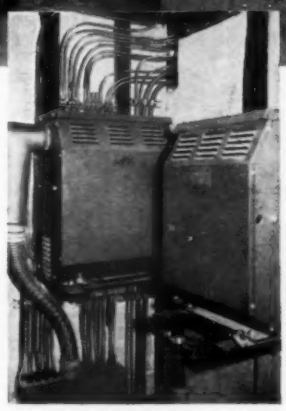
Only General Cable manufactures both...



Installation at the St. Regis Paper Company, Jacksonville, Fla. plant

TYPE M.I. CABLE

for distribution, control and lighting circuits



INTERLOCKING ARMORED CABLE

for primary power feeder circuits

Easy to install in all locations, both Safety M I Cable and Interlocking Armored Cable require no mechanical protection, thus lowering costs of installation and minimizing space requirements. These constructions are easy to train around equipment or structural members, assuring the absolute minimum of interference, and present a neat, functional appearance. In addition, Safety M I Cable has unequalled physical and electrical properties: it is completely resistant to moisture, aging, nearly all chemicals, and operates at continuous high temperatures. For truly modern wiring in your plant, specify Safety M I Cable and Interlocking Armored Cable. And remember; only General Cable makes them both.

GENERAL CABLE CORPORATION 420 Lexington Avenue, New York 17, N. Y.
Offices and Distributing Centers Coast-to-Coast

for quality and service... **specify GENERAL CABLE**

For more facts circle 541 on Reply Card

A COMPLETE LINE OF
ROLLER CONVEYERS
engineered and standardized by

MATHEWS

Lines of roller conveyer used for packaging of tractor repair parts where orders are made up for shipment.

The Mathews line of roller conveyer is complete, with rollers ranging from 1-⅜" to 6-½" in diameter, and with capacities from 60 lbs. to 13,000 lbs. High quality ball bearings are used throughout.

Accessories such as turntables, hinges and switches are available from stock.

A full line of couplings and supports makes the installation of Mathews Roller Conveyer lines convenient and easy.

For latest information write for CATALOG 156

MATHEWS CONVEYER COMPANY
GENERAL OFFICES . . . . . ELLWOOD CITY, PENNSYLVANIA
PACIFIC COAST DIV. . . . MATHEWS CONVEYER COMPANY WEST COAST, SAN CARLOS, CALIFORNIA
CANADIAN DIVISION . MATHEWS CONVEYER COMPANY, LTD., PORT HOPE, ONTARIO.

MATHEWS
Over Fifty Years of Leadership in Mechanized Handling

For more facts circle 542 on Reply Card

OPERATION—PRODUCTION

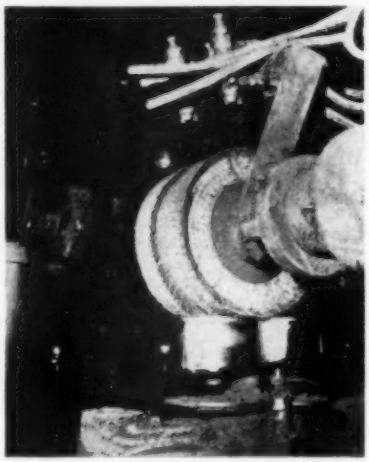
(O and P begins on page 54)

nished by Greer Hydraulics, Inc., is precharged with nitrogen gas. As the pump of the truck's hydraulic system forces oil in the shell, the gas bag compresses to balance line pressure. Any sudden impact at the fork or clamp forces oil into the accumulator. Shock is absorbed and cushioned by the compression of gas-filled bag.

Buffing With Liquid Saves Time

BUFFING headlight shells with a liquid compound spray system speeds them on their way to the anodizing cycle. Ordinary electrocleaning removes all traces of the abrasive used during the buffing operation.

Designed by engineers of Han-



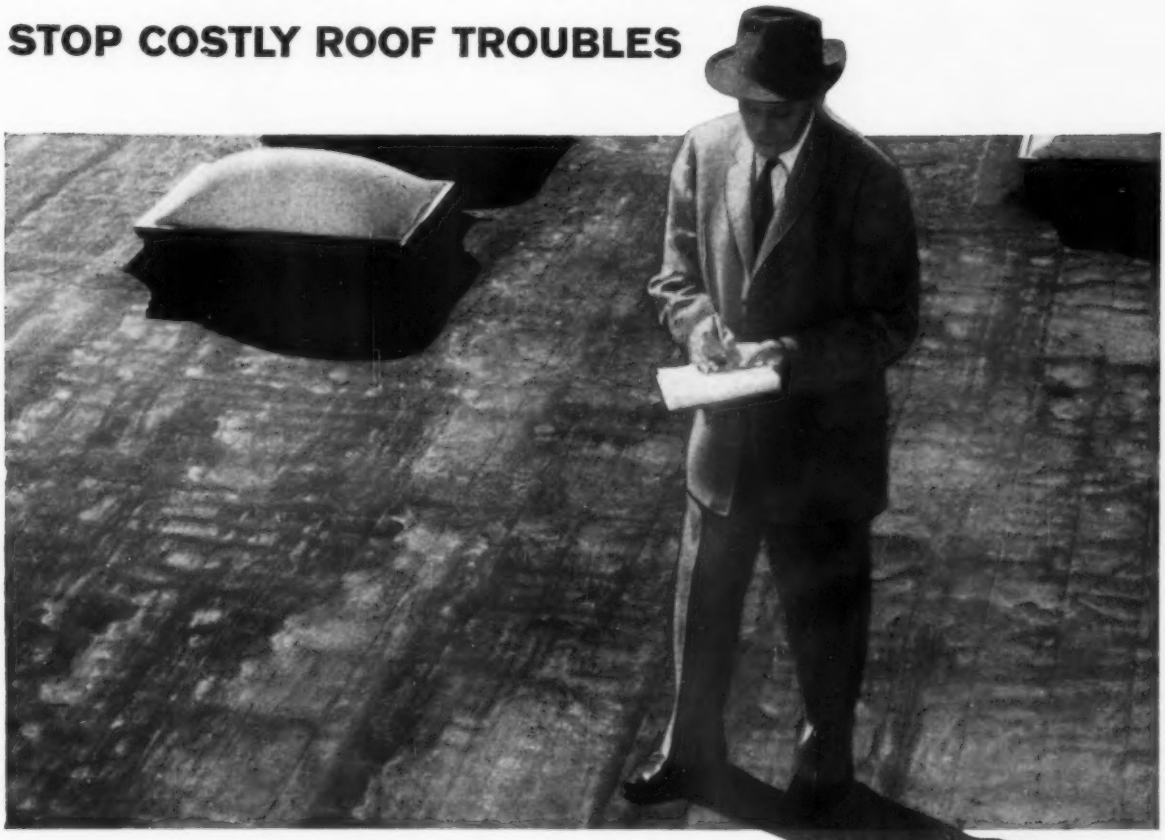
Liquid compound is sprayed on buffing wheel and limits abrasive action to contact area between wheel and work.

son-Van Winkle-Munning Company, Matawan, N. J., the system consists of an air-operated pump in the compound reservoir, distribution lines and spray guns that deliver metered quantities of liquid compound spray at intervals governed by a timer.

Distribution is effected by one line that carries the compound under pressure from the pump and by plant air lines that transmit air under pressure to the spray guns. Both air lines are filtered. At each gun head, pressurized air and compound are delivered into

A Johns-Manville Roof Survey helps to . . .

STOP COSTLY ROOF TROUBLES



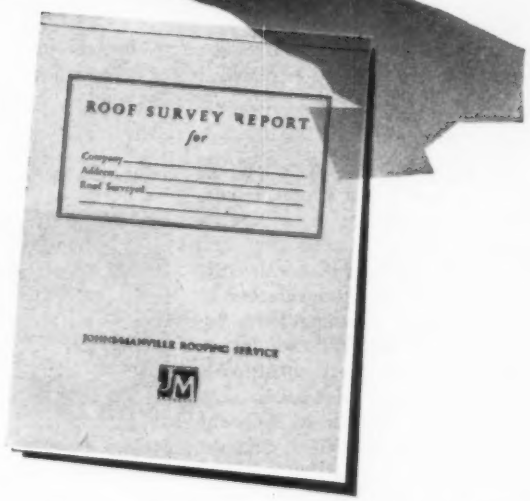
DON'T BE CAUGHT with costly roofing troubles. Even though your roof never has leaked, there may be defects you haven't noticed.

To spot possible trouble, it pays to have your roof inspected by an expert every year or so. And, your J-M Roofing Contractor is the man to do it.

His inspection will cover not only the main roofing areas, but also the flashings, parapet walls, skylights, drains, pent-houses . . . everything on your roof that has a bearing on its ability to keep out the weather.

For a free Roof Survey, call your J-M Roofing Contractor. He is listed in the Classified Telephone Directory.

For further information about what may be happening to your buildings, send for the 40-page booklet, "Things You Should Know About Your Roof." Write to: Johns-Manville, Box 158, New York 16, N.Y. In Canada, write: Port Credit, Ontario.



The J-M Roof Survey is made without obligation. A written report will tell you what defects are found, what you should do and how you can do it.

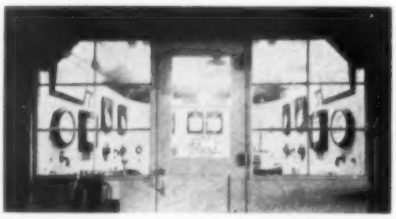
JOHNS-MANVILLE

For more facts circle 543 on Reply Card

New Wheelabrator® Ultra-Filtration keeps control room air "vacuum" pure

Wherever ultra-clean air is essential, as in this electrical equipment control room of a leading steel mill, low-cost Wheelabrator **Ultra-Filtration** provides the most effective and economical method you can employ.

Ultra-Filtration removes even the most minute particles of foreign matter from the atmosphere, leaving the air cleaner than clean — as close to absolute purity as any practical means can achieve.



Control and motor rooms, laboratories, instrument and spectograph areas — or areas that must have dependably and consistently pure air — are best protected by Wheelabrator Dustube Ultra-Filtration. Machinery and instruments function more consistently with minimum downtime and maintenance caused by air-borne contaminating particles. And the Ultra-Filtration unit itself works continuously and automatically, with no attention and practically no maintenance cost.

For detailed information write today for Bulletin No. 558-D

WHEELABRATOR
CORPORATION

859 South Byrkit Street, Mishawaka, Indiana
Canadian Offices: Scarborough (Toronto) – Montreal
For more facts circle 544 on Reply Card

OPERATION — PRODUCTION

(O and P begins on page 54)

a common stream so that the compound is broken up into a fine spray.

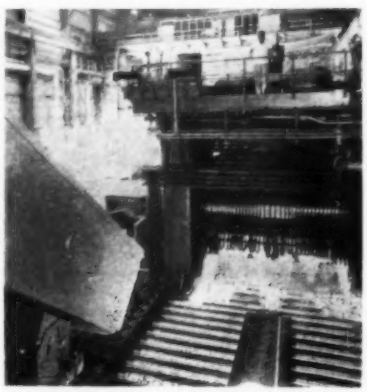
Catalyst Oxidizes Toxic Gases

Nitric acid and nitrogen oxides generated at toxic levels at Koppers Company Inc., Arroyo, West Virginia, are collected and passed through a catalytic reduction system before discharge to the atmosphere for the protection of plant personnel and surrounding neighbors. Designed by Catalytic Combustion Corporation, system reduces nitrogen oxides to harmless free nitrogen.

TV Reduces Roll Cycle Time

INGOTS heated up to 1175 F and weighing as much as 12,000 lbs are reduced in thickness by operators at Kaiser Aluminum's Ravenswood Works who control the rolling process while viewing it on two General Electric closed-circuit television systems.

Seated in air-conditioned pulpits

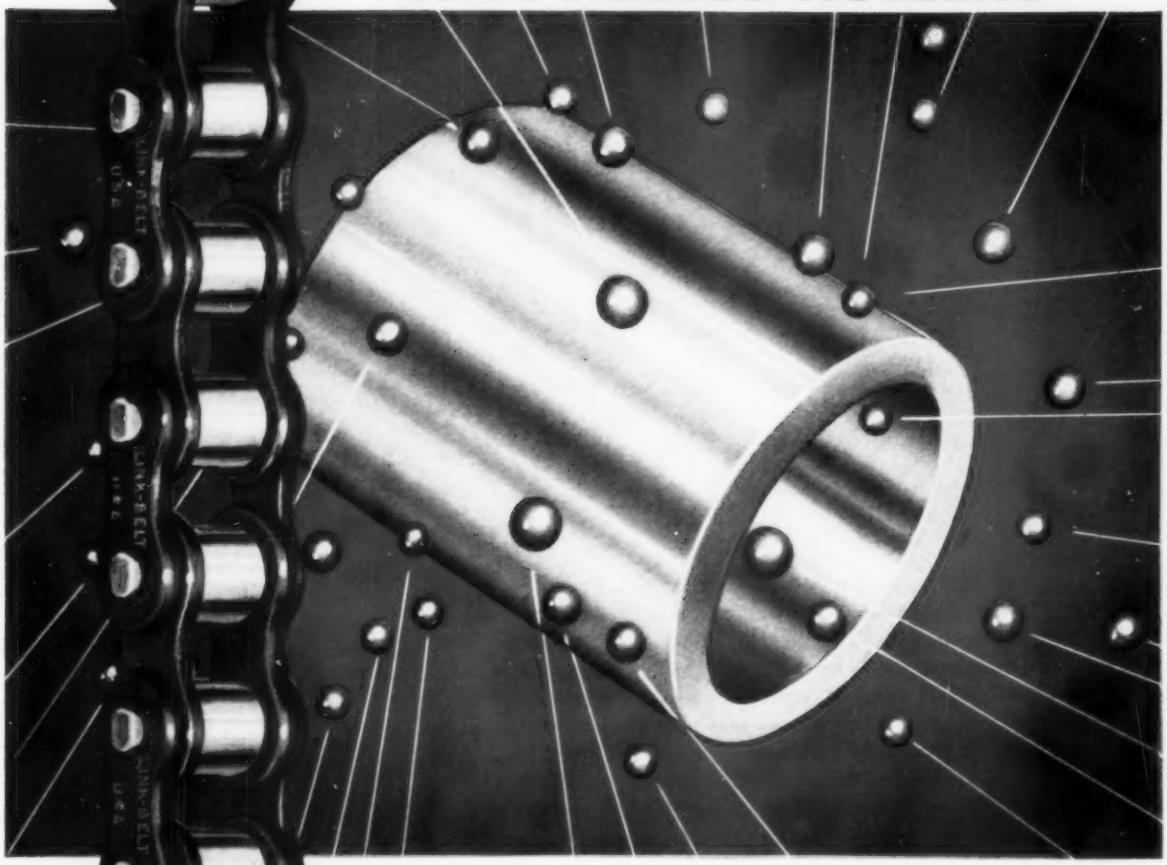


TV camera, aimed at blind side of mill, tells operator when rolls are clear.

Shining example of "extra" chain quality

SILVER-BRITE

SHOT-PEENED ROLLERS



EXTRA LIFE IS POUNDED IN AND NOT POLISHED OUT

Rollers for Link-Belt precision steel roller chain are now finished by a special burnishing process to a "Silver-Brite" luster! And this is accomplished *without grinding away the benefits imparted by shot-peening*—a Link-Belt process that cold works the metal and provides extra fatigue life.

Many more special Link-Belt "extras" contribute to the dynamic strength so important for today's heavy loads and high speeds: close heat-treat control . . . lock-type bushings . . . pitch hole preparation . . . pre-stressing.

Ask your Link-Belt office or authorized stock-carrying distributor for new 154-page Catalog 2657—the most complete roller chain data book ever compiled.

LINK-BELT

ROLLER CHAINS & SPROCKETS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World. 14,978

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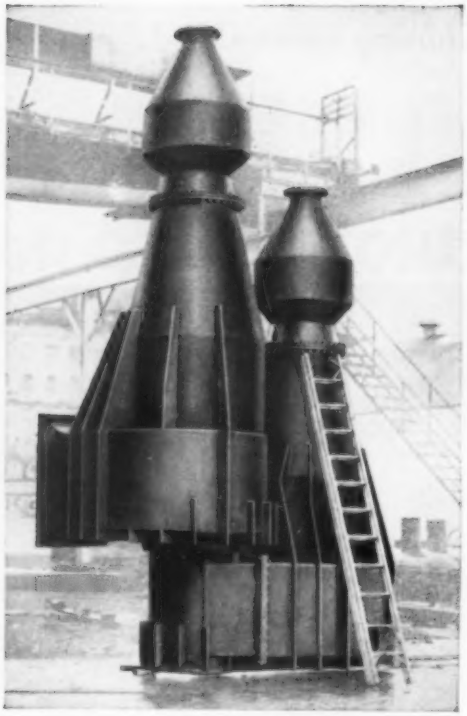
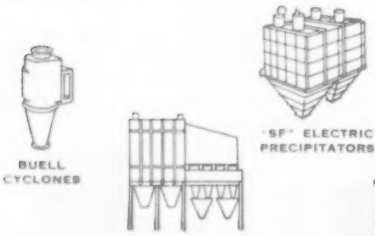


Exploring new frontiers!

But these aren't satellite launchers, though they're specially designed for high temperature operation: they're Buell extra-efficient cyclone dust collectors . . . and the new frontiers they're exploring are in industry. Everywhere in American industry, from cement mills to refineries, from chemical plants to power generating stations, Buell collectors set new records in percentage of dust removed, low maintenance, and improved plant operation. Even in the age-old field of fly ash collection, Buell extra efficiency pays off. Only *Buell* cyclones have the unique Shave-off port that traps small fines in the double eddy currents. And Buell large-diameter design eliminates bridging, clogging, or plugging. *All three* Buell Systems are illustrated and described in "The Collection and Recovery of Industrial Dusts". Write for a copy to Dept. 14-K, Buell Engineering Company, Inc., 123 William St., New York 38, N. Y.



buell®

Experts at delivering Extra Efficiency in

DUST COLLECTION SYSTEMS

For more facts circle 546 on Reply Card

OPERATION — PRODUCTION

(O and P begins on page 54)

overlooking the 168-in. and 110-in. four high reversing mills, the operators use the television cameras to give them an unobstructed view as the ingots are broken down into slabs and rolled into the desired thickness.

When the slab being rolled is on the blind side of the mill, the operators can tell at a glance at their TV monitors when it is ready for the return pass. Mirrors were formerly used for this process but they often clouded up, gave the operators an inverse image and required frequent adjustment because of vibration. All of these disadvantages have been eliminated by the use of closed-circuit television.

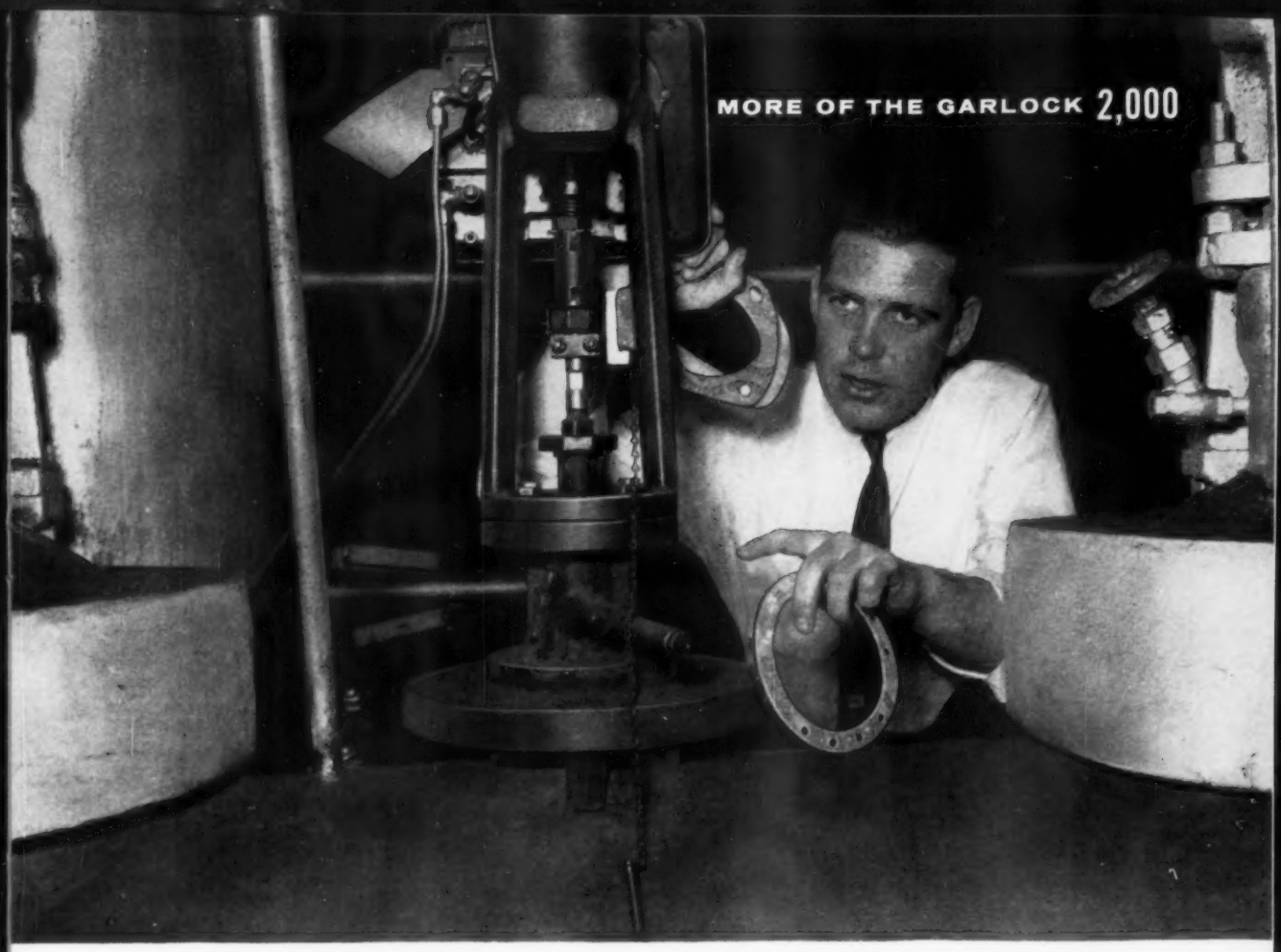
Lighting requirements for the TV camera are considerably lower than those for mirrors. Only two 150-watt PAR 38 spotlights are used.

Sequence Drilling Saves Time

Using 24 Walker-Turner 20-in. drill presses on a single 36-ft-long production table makes multiple hole drilling a production operation at Moore Products Co., Philadelphia. Used for jobs requiring four to 24 operations, work is passed from one spindle to the next with less time consumed in handling.

Low Cost Level Control Fills Containers Accurately

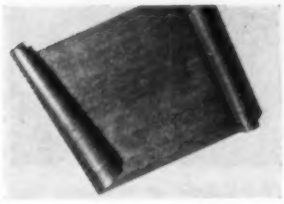
DESIGNED by company engineers, a simple level control system is helping to speed production in an automatic acid packaging machine at Cornwell Chemicals



"If you're gasketing against steam or gases to 700°F., try GARLOCK 900"

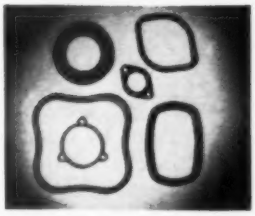
Most engineers agree, that safe positive sealing of pipe flanges and gasketed joints on systems handling steam, gas, or air to 700° F. is best accomplished with a gasket material such as Garlock 900 which is resistant to plastic flow, but is compressible enough to compensate for surface irregularities. Garlock 900 is made from long fiber Canadian asbestos and a special rubber compound bonded under pressure and vulcanized into a homogeneous structure . . . compressible, yet resistant to plastic flow.

"...for hot oils use GARLOCK 7021"



Sealing against hot oils to 700° F. on pipe lines, internal combustion engines, compressors, or other high temperature applications calls for a strong dense gasketing such as Garlock 7021 . . . oil resistant, compressible, yet unusually resistant to plastic flow under heavy bolt loads.

"...for solvents to 300°F.—GARLOCK 7228"



This Compressed Asbestos and Neoprene Gasketing for gasketed joints and pumps, provides the desired compressibility necessary for safe gasketing on systems handling solvents or oils . . . without plastic flow under heavy bolt loads.

These high temperature gaskets are still another part of the Garlock 2,000 . . . two thousand different styles of packings, gaskets, and seals for every need. The only complete line. That's why you get unbiased recommendations from your Garlock representative. Call him or write for Gasket Folder AD 162.

THE GARLOCK PACKING COMPANY, Palmyra, N.Y.

For prompt service, contact one of our 30 sales offices and warehouses throughout the U.S. and Canada.

GARLOCK

Packings, Gaskets, Oil Seals, Mechanical Seals, Molded and Extruded Rubber, Plastic Products

For more facts circle 547 on Reply Card

REMINDER!

Have you changed your electrical system over to winter?

Let's reduce motor burnouts this year. Remember to change your motor protectors back to winter ratings.

During the hot summer months, many maintenance departments are forced to up-rate the elements in motor protectors to prevent nuisance stoppages due to high temperatures. When winter comes, they neglect to change back to normal ratings. That's when many motor burnouts occur.

ELIMINATE THE WHOLE PROBLEM

You can lick the whole problem, and eliminate motor burnouts too . . . just by using Heinemann Motor Controllers. The rating of Heinemann Motor Controllers is unaffected by heat or cold. No unnecessary stoppages in summer; no change-overs for winter.

The difference is that Heinemann Motor Controllers operate on power, not heat. Instead of thermal elements, they employ a hydraulic-magnetic principle that you should know about.

Send for a copy of Manual 101, *"What you should know about Circuit Breakers"* and Bulletin 1410 on Heinemann Motor Controllers. HEINEMANN ELECTRIC CO., 128 Plum St., Trenton 2, N. J.

HEINEMANN *Motor Controllers*

For more facts circle 548 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 54)

Corporation, Cornwell Heights, Pa. The system helps to solve the problem of continuous filling of containers with sulfuric acid used as an electrolyte in automobile storage batteries.

Basic principle of the filling operation is to maintain a constant head in an acid tank from which a hose drains acid for a pre-determined time. With a fixed head and constant area for flow, the quantity can be accurately controlled on the basis of time.

Level control is provided by a low cost pressure controller manufactured by U. S. Gauge. Basically a pressure measuring device, the controller utilizes back pressure in an air purge system to measure hydrostatic head as a measure of tank level.

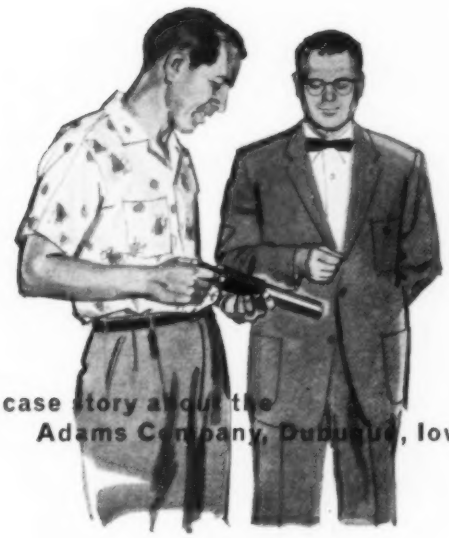
The control system incorporates pneumatic proportional control to position a diaphragm valve on the inlet acid line, thereby maintaining a fixed head in the storage tank.

Foam Unit For Remote Control

Designed for use at oil refineries and chemical plants, a remote control foam unit has been developed by the Akron Brass Mfg. Company, Inc., Wooster, Ohio. Remote controls, placed a quarter of a mile away, raise, lower, rotate and change stream widths of the unit, all directed with the aid of field glasses.

Bob showed them a new product that ended rust on work and tools—

STANDARD Special Transparent Coolant



A case story about the Adams Company, Dubuque, Iowa

Before Standard Oil lubrication specialist Bob Wenger told The Adams Company management about Standard's SPECIAL TRANSPARENT COOLANT, there had been considerable trouble with rusting of work and machines in the plant. There had also been trouble with deposits on the ways of the grinding machines. Rust occurring on parts being processed was resulting in damage and even losses. This has been changed.

"Since we changed to your SPECIAL TRANSPARENT COOLANT, we have not had any rusting or deposits on our machine tools, and this product has eliminated the rusting problem on parts being processed through our plant," says Harlow Adams, president of the company.

The Adams Company found they received important additional benefits as well. Operators could now see their work clearly. There was less wheel loading. Because the coolant didn't foam, more of it stayed on the wheel resulting in cooler operation. Faster cuts were obtained with finer wheels. Finer wheels gave better finishes. Periods between dressings were extended. Tolerances were maintained.

Research, development and more than two years of field testing have gone into Standard's SPECIAL TRANSPARENT COOLANT. This is the pay-out to you on the research done by Standard Oil to bring you better metalworking products. Find out more about Standard's SPECIAL TRANSPARENT COOLANT. Call your nearby Standard Oil lubrication specialist in any of the 15 Midwest or Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

Quick facts about
Special Transparent Coolant

- Clear, transparent fluid.
- Able to control corrosion and rust on work and machines.
- All chemical. Does not support bacteria growth.
- Unaffected by humidity.
- Nonfoaming.
- Fire resistant.
- Odorless.

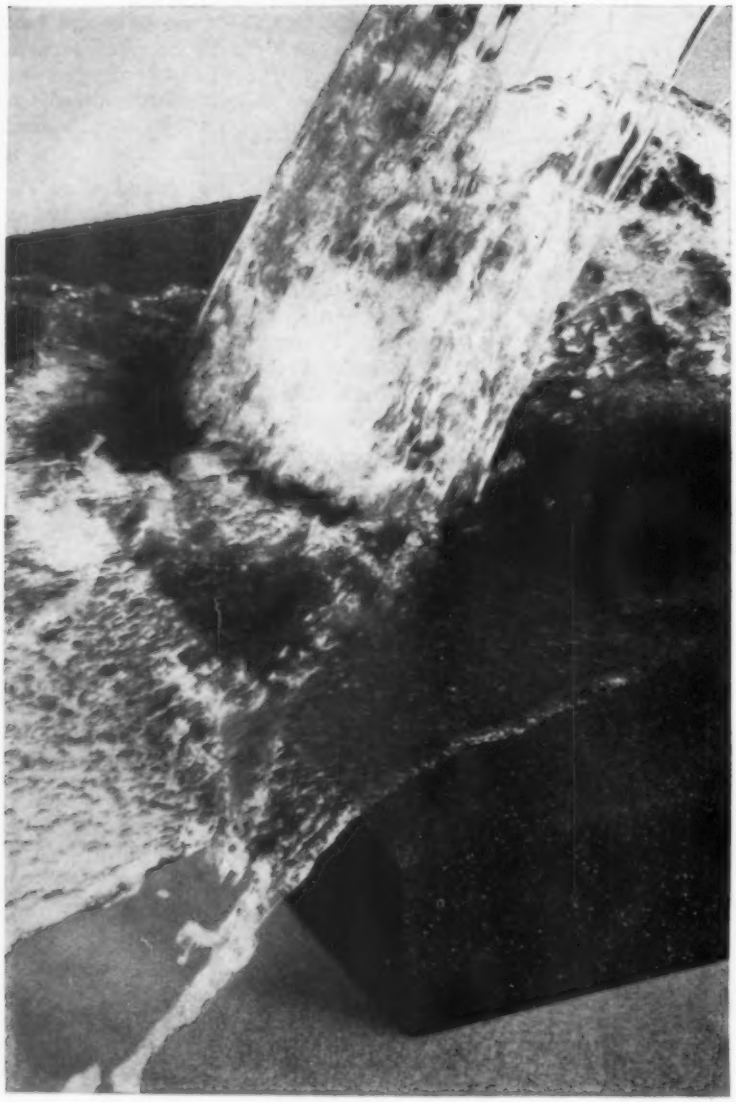
No rust. Shaft ground with Standard's SPECIAL TRANSPARENT COOLANT shows no rust on inspection by A.T. Murphy, General Superintendent, Harlow Adams, President, and Bob Wenger, Standard Oil lubrication specialist.

You expect more from STANDARD *and get it!*

For more facts circle 549 on Reply Card

Only cellular glass insulation

FOAMGLAS® IS THE ONLY



Whether you insulate building roofs and walls, piping or equipment, you can seldom anticipate *all* of the conditions to which your insulation will be exposed after installation. Humidity conditions change. Temperature control needs vary. Even the original use for insulated space or equipment may alter. That's why the ideal thermal insulation must give you a *combination* of key benefits . . . in order to serve satisfactorily under all possible conditions.

Most important, the ideal insulation must be impervious to water vapor as well as liquids—in order to insure constant performance under all humidity exposures. It should be proof against acids and acid vapors. It should be incombustible . . . dimensionally stable . . . impervious to vermin . . . strong enough for a variety of structural uses. Just one insulation—cellular glass—meets all of these qualifications.

FOAMGLAS is the only cellular glass insulation.

FOAMGLAS may well be the one satisfactory solution to all your insulating problems. For detailed literature, write—specifying your particular insulation requirements—to Pittsburgh Corning Corporation, Dept. PE-118, One Gateway Center, Pittsburgh 22, Pennsylvania.

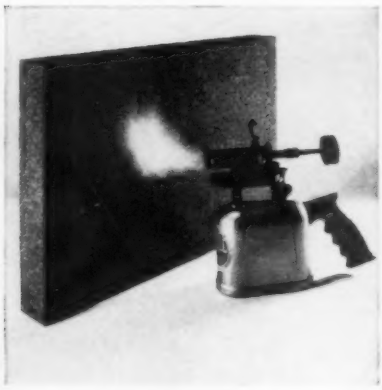
PC Glass Blocks and FOAMSIL® are other outstanding products of Pittsburgh Corning.

P I T T S B U R G H

gives you all these key benefits

CELLULAR GLASS INSULATION

Moisture-proof! The minute liquid or vapor enters an insulation, it begins to lose its insulating value because moisture conducts heat. FOAMGLAS, a material composed entirely of sealed glass cells, is completely impervious to all moisture. Its K factor—measure of insulating performance—never varies.



Can't Burn! Smoldering insulation in walls or roof of a building is a deadly fire hazard, hard to detect, difficult to control once detected. FOAMGLAS eliminates this hazard because it is the only insulation composed entirely of incombustible glass. This may even mean lower fire insurance rates in some cases.

Dimensionally Stable! Most insulations tend to warp, swell, shrink or slump after they are installed. This causes open joints in the insulation . . . insulation voids that create a serious loss of efficiency. There is no such difficulty with FOAMGLAS. This all-glass insulation always maintains absolute dimensional stability.

Vermin-proof! Most insulations offer no protection at all against vermin in food processing, storage or handling operations. Rats and other vermin gnaw right through them. FOAMGLAS, on the other hand, affords an excellent vermin barrier. Its all-glass composition offers no food or nesting materials for vermin.

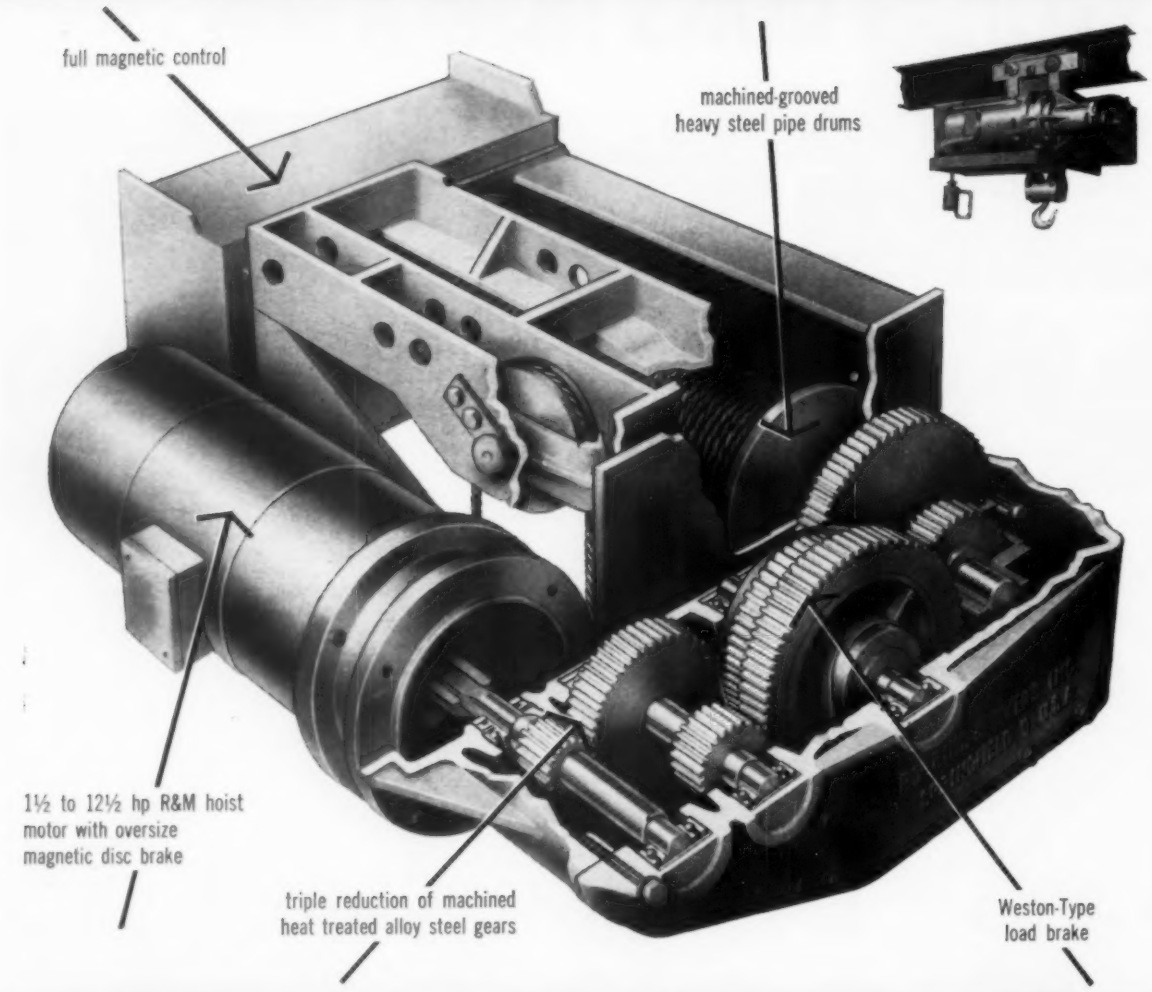
Strongest! FOAMGLAS has a compressive strength of over 7 tons per square foot (av. ult.). It forms a solid base for built-up roofing. It makes possible the placing of insulation beneath heavily loaded floors. And high strength FOAMGLAS permits such cost saving design innovations as free standing walls and partitions.

Acid-proof! There is often a lot of acid around a processing operation. Even the atmosphere around processing plants frequently has a high acid content. Acids will attack and destroy most thermal insulating materials, but they won't harm FOAMGLAS. This unique all-glass material is completely impervious to all common acids.

CORNING

For more facts circle 550 on Reply Card

big hoist value



R&M Type F standard low-headroom hoists excel in the heaviest, most severe service. Frame is solidly braced welded steel. Special weather and dustproof R&M hoist motor runs cool, has the highest time rating found in any standard hoist—30 min., 55° C. rise. And the oversize magnetic disc type motor brake requires virtually no adjustment. Full magnetic control with reduced push-button voltage is standard. With lug mounting, Type F-2 headroom is only 16½" in 2 ton capacity.

Capacities: ½ to 10 tons. Speeds: 10 to 54 fpm. Lug mounting; push, hand geared or motorized trolleys.

Robbins & Myers, Inc., Hoist & Crane Div., Springfield, O.

For more facts circle 551 on Reply Card

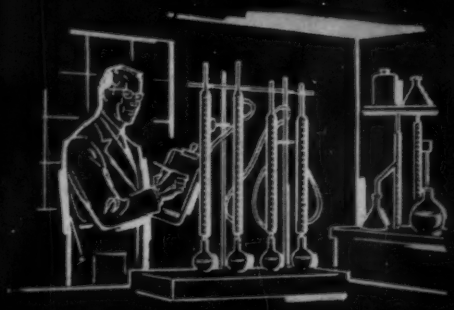
take it up with

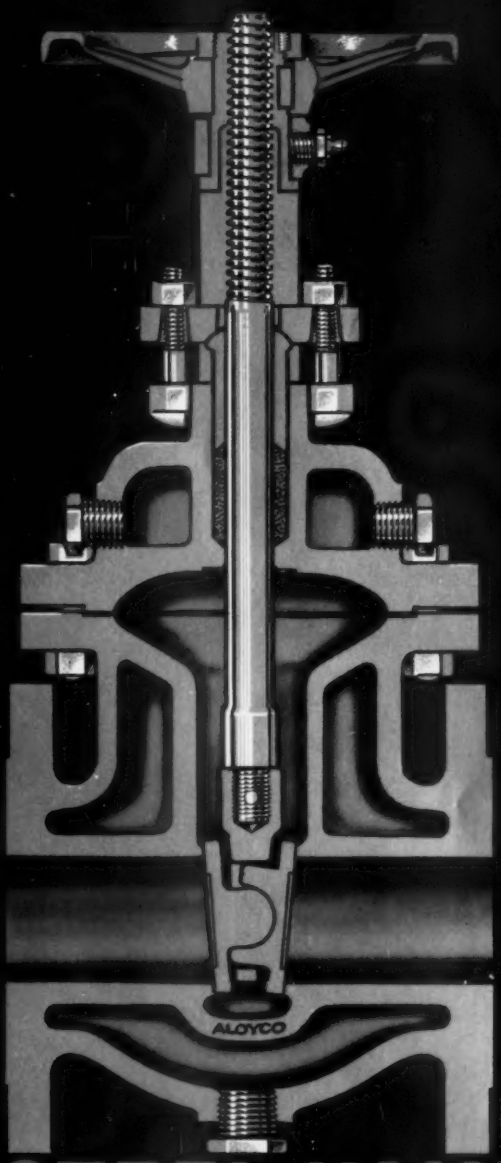
ROBBINS & MYERS

hoists cranes

Request Bulletin 801-C today

For more facts circle 552 on Reply Card →





Thirty years' research devoted exclusively to...

STAINLESS STEEL VALVES

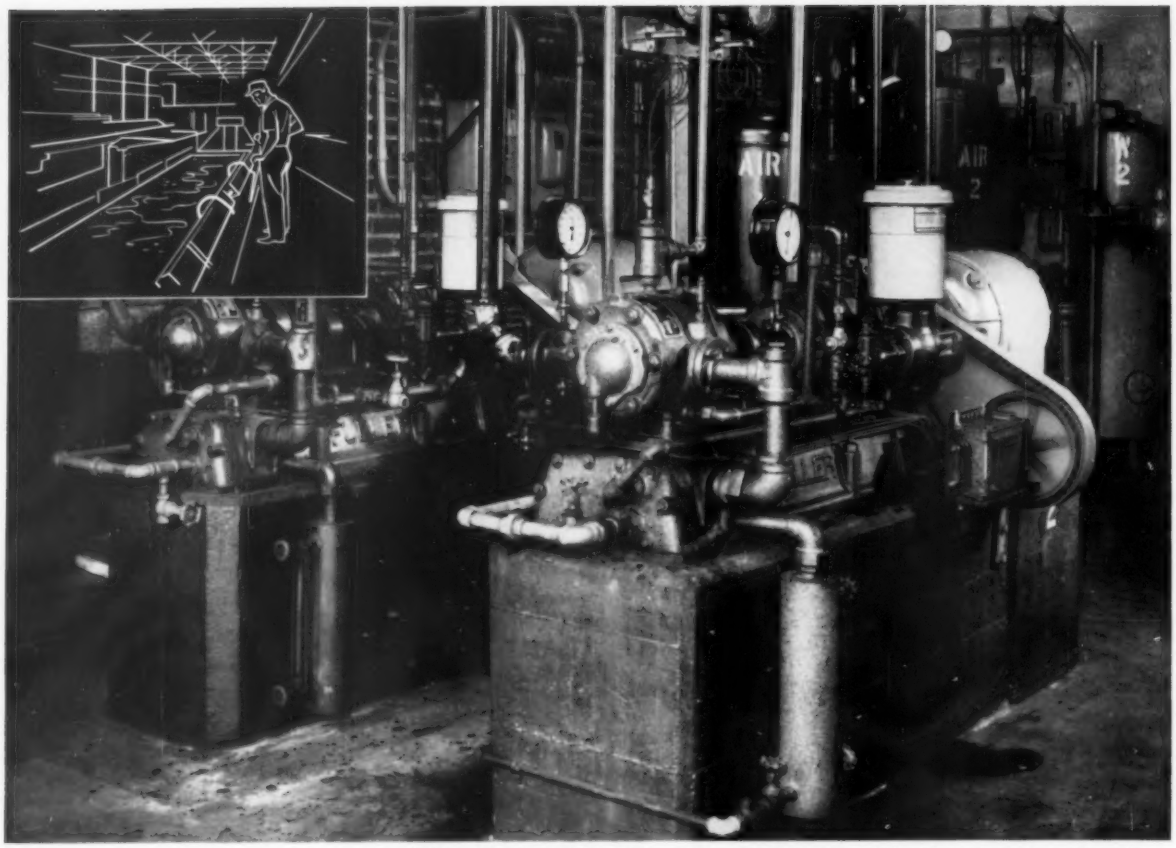
Aloyco's specialized research . . . in the field and in the lab . . . brings you a wealth of metallurgical information for successfully solving your corrosives-handling problems.

Coupled with continuing research in design, foundry and machining techniques, this Aloyco specialization results in new and better corrosion resistant valves for many specific applications. One example above: Aloyco completely jacketed valves (the first ever to be integrally cast in high alloys) are designed for viscous liquids and other fluids difficult to move at room temperatures.

Isn't your surest source of supply the one company with research, manufacturing and sales all devoted to Stainless Steel Valves exclusively?

Longer Lasting
ALOYCO
VALVES
1ST IN CORROSIVE SERVICE

ALLOY STEEL PRODUCTS COMPANY
Linden, New Jersey



These two-stage Fuller Rotary Compressors are direct electric motor driven through flexible couplings to provide compressed air for a large eastern steel company.

5 YEARS WITHOUT A HITCH!
. . . FULLER Rotary Compressor
helps keep steel plant operating around the clock!

Compressed air is so vital in the alloy tube division of this large eastern steel company, that the plant would have to shut down without it!

The chief maintenance engineer of the company writes: "The first Fuller Rotary Compressor was purchased on the basis of experience by other users and cost comparison with other compressors.

"The second Fuller Rotary Compressor was purchased on the basis of the fine performance given by the first compressor. The most outstanding feature of Fuller Rotary Compressors is that they give trouble-free continuous operation".

Fuller rotary compressors can be installed in limited quarters and on ordinary flooring. They give long life and smooth operations. The elimination of valves, crankshafts, pistons and other moving parts greatly reduces the need for attention, adjustment and replacement. Blades are held out by centrifugal force, automatically compensating for wear, thus maintaining new machine efficiency and capacity. The rotary principle permits a design completely free of reciprocating parts, avoiding the basic cause of pulsation.

There is a Fuller Rotary Compressor to fit your particular needs. Write today for complete details.

"See Chemical Engineering Catalog for details and specifications."

Fuller

FULLER COMPANY GENERAL AMERICAN TRADE MARK

FULLER COMPANY C-324 4915

138 Bridge St., Catasauqua, Pa.

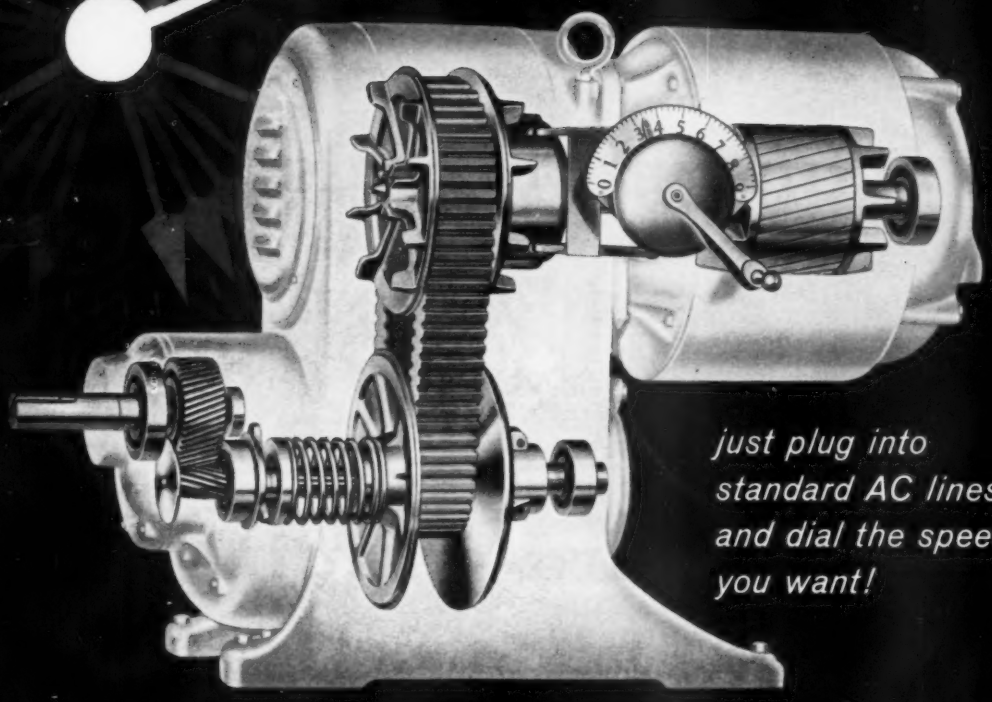
SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORPORATION

Birmingham • Chicago • Kansas City • Los Angeles • San Francisco • Seattle

PIONEERS OF HIGH-EFFICIENCY VANE TYPE ROTARY COMPRESSORS SINCE 1930

For more facts circle 553 on Reply Card

any RPM simply on AC!



just plug into standard AC lines and dial the speed you want!

U. S. VARIDRIVE Motors

...one unit...infinite speeds!

So *simple* to get any speed you want, directly from standard AC power lines—with U.S. VARIDRIVE MOTORS! One compact, self-contained unit does it. With U.S. VARIDRIVE, you don't have to buy a DC converter, DC generators, complicated and delicate electronic circuits. Just *plug in* this one simple unit—dependable, easy for your regular personnel to maintain. You merely dial, and get smooth, stepless speed changes immediately! Thus, you set speeds for maximum production as needs vary...*increase* machine efficiency...output...product quality! *Decrease* costs...rejects...manpower and materials waste! Available in RATINGS: ¼ to 60 H.P. Specify: "U.S. VARIDRIVE MOTOR."

U.S. ELECTRICAL MOTORS INC.

BOX 2058, LOS ANGELES 54, CALIFORNIA
OR MILFORD, CONNECTICUT

FREE COLOR BROCHURE
...Send for U.S. Varidrive Bulletin No. 1797

For more facts circle 554 on Reply Card

Johnson Controls Provide Ideal Working Climate in This Award-Winning Plant

Listerine, Richard Hudnut, Du Barry and other famous name products are made here. Johnson Controls keep this air conditioned packaging area as comfortable as an executive office.

One of the outstanding assets of the efficient new Lambert-Hudnut plant in Lititz, Pennsylvania, is its physical environment. Its striking design, scenic setting, spacious, bright plant and office areas and excellent employee facilities rate with the best anywhere! *Factory* magazine named it one of the top 10 plants in 1957.

A key feature of this modern environment is a specially planned Johnson Pneumatic Temperature Control System that operates the plant's high velocity, dual duct air conditioning systems, the high temperature (350 F) hot water heating system and the ventilating systems. Flexibly engineered so that each room or work area is individually controlled, the Johnson System assures an ideal working climate for Lambert-Hudnut employees.

Lambert-Hudnut Manufacturing Laboratories, Lititz, Pa., subsidiary of Warner-Lambert Pharmaceutical Co. A. M. Kinney, Inc., architect and engineer, Cincinnati; R. E. Lamb, general contractor, Philadelphia; Howard P. Foley Co., mechanical contractor, Pittsburgh.

Such an environment makes important contributions to working efficiency, helps attract and hold good employees and cut absenteeism and costly turnover. (In many plants, too, products must be handled and processed under closely controlled temperature and humidity conditions.)

When *you* build or air condition, ask your consulting engineer, architect or local Johnson representative to show you how Johnson Pneumatic Controls can provide you with similar benefits. The specialist Johnson organization has installed the pneumatic temperature control systems in a majority of the nation's leading buildings, of all types and sizes. Johnson Service Company, Milwaukee 1, Wisconsin. 105 Direct Branch Offices.

GET THE "PLUS" VALUES OF PNEUMATIC CONTROLS BY JOHNSON

- **Widest Application.** Johnson Controls are applied to all types and makes of air conditioning, heating and ventilating equipment, and can meet any comfort or process requirement. Each system is engineered to meet the exact needs of the individual plant.
- **Greater Simplicity.** Pneumatic control involves far fewer and much simpler components than anything else you can use. There are fewer components to check, fewer parts subject to failure.
- **Choice of Features.** Johnson makes the most complete line of pneumatic temperature, humidity and pressure control equipment to match your needs.
- **Reliable Performance.** Johnson Pneumatic Controls are unaffected by short circuits, electrical overloads, voltage variations and humidity. You get continuous, accurate control.
- **Complete Safety** . . . even in the presence of explosive gases, solvents, dusts and other hazardous materials.
- **Dependable Service** . . . Johnson maintains the oldest and largest service organization in the industry. Full time, factory trained service men are on duty in 105 direct branch offices and over 200 other cities.

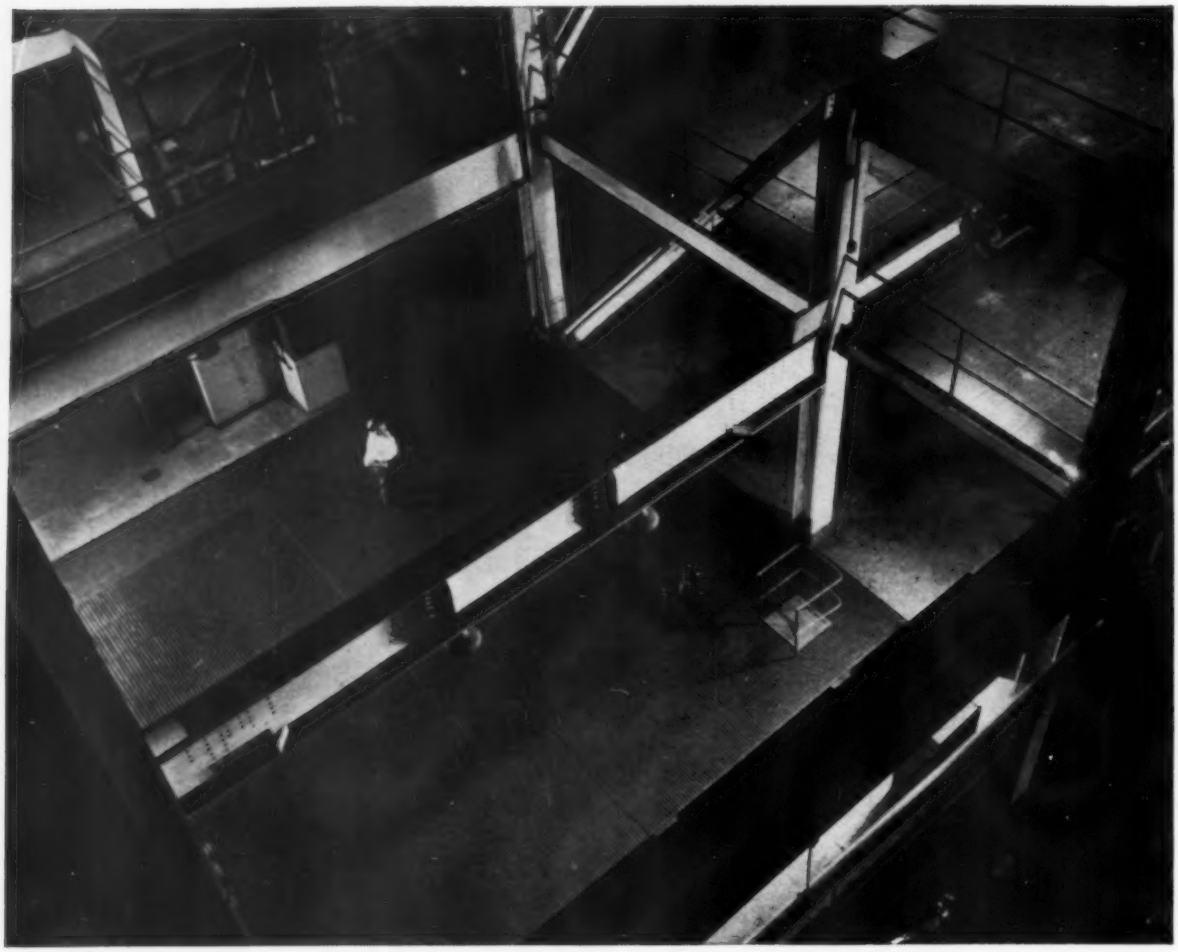
JOHNSON CONTROL

PNEUMATIC SYSTEMS

DESIGN • MANUFACTURE • INSTALLATION • SINCE 1885

TEMPERATURE CONTROL SYSTEMS FOR SCHOOLS, OFFICES, FACTORIES, STORES, HOSPITALS, HOTELS, PUBLIC BUILDINGS

For more facts circle 555 on Reply Card



Blaw-Knox Electroforged® Steel Grating provides removable floors to simplify plant operation

Floors and mezzanines made of Blaw-Knox grating solve the problem of reaching, moving and servicing the largest types of equipment. Sections come up easily, allowing ample space to maneuver and maintain any size of machinery. Costly, time-consuming alterations are virtually eliminated.

For increased plant safety Blaw-Knox Electroforged Steel Grating provides rigid one-piece construction for sure support of the heavy loads. Non-slip cross bars and a wide variety of bearing bars assure safe walking and climbing — even under the most hazardous working conditions.

Because there's nothing to wear, or patch, nothing to catch and retain dirt, upkeep becomes easy and economical. And grating's maximum open area admits more air and light, makes brighter, better-ventilated plants.

Blaw-Knox Electroforged Steel Grating for walkways, stair treads and floors is fabricated to meet your specific operating needs. For new ideas about a complete line of space saving grating, write for Bulletin 2527 featuring grating and treads.

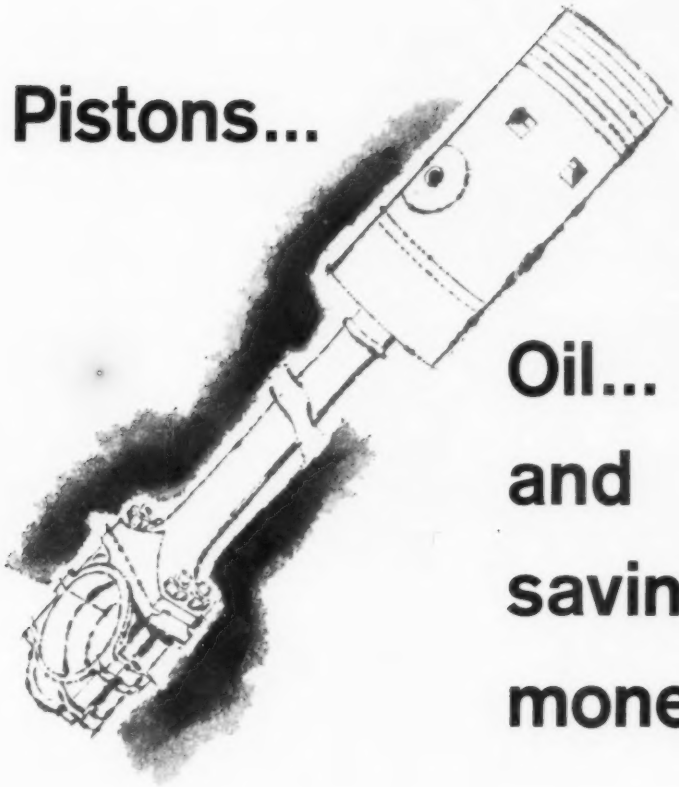
BLAW-KNOX

BLAW-KNOX COMPANY

Equipment Division
Dept. H, Pittsburgh 38, Pennsylvania

For more facts circle 556 on Reply Card

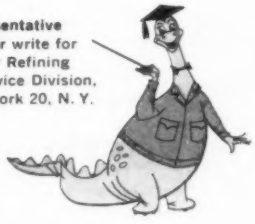
Pistons...



Oil... and saving money

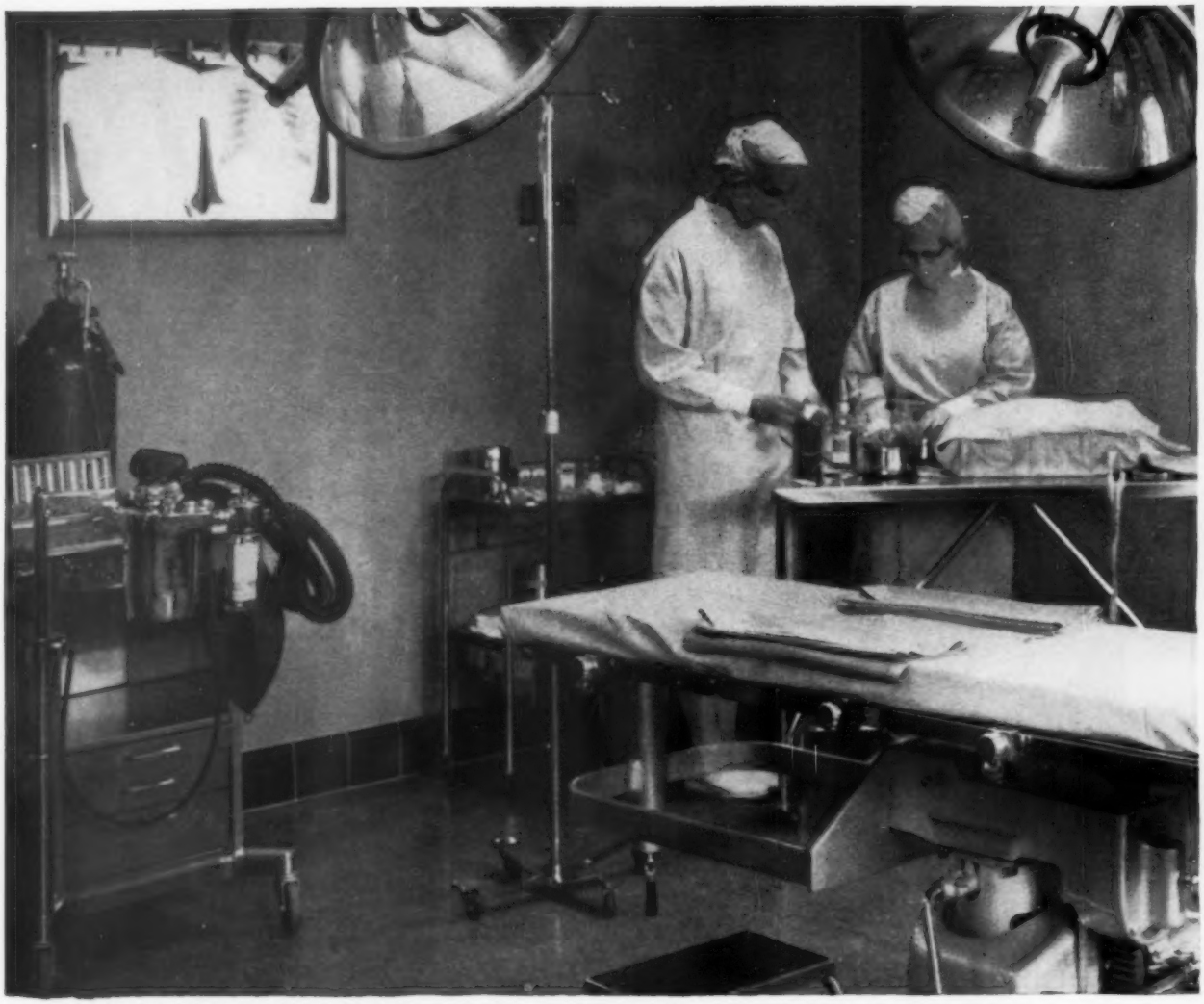
The longer your pistons work before need of ring replacement—the less your cost of operation. Sinclair Rubilene® Oils have the reputation for giving longer service to cylinders, rings and other vital parts. Refill with Rubilene now. Next time management asks how you've cut costs, tell them you've switched to Sinclair—and show them the results.

Call your Sinclair Representative for further information or write for free literature to Sinclair Refining Company, Technical Service Division, 600 Fifth Avenue, New York 20, N. Y. There's no obligation.



SINCLAIR
Rubilene® Oils

For more facts circle 557 on Reply Card



OPERATING ROOM QUIET is maintained even though a Westinghouse DS-3 dry-type transformer is only a few feet away. "Only well-engineered equipment," states architect Calvin M. Butler, "can achieve both the quiet and constant operation demanded in this location."

Compact new Westinghouse dry-type transformers give "virtually silent" operation in Arizona hospital

Quiet operation and compact construction dictated the choice of Westinghouse DS-3 dry-type transformers for the new Louis Galland Memorial Wing of St. Luke's Hospital in Phoenix, Arizona.

"The importance of quietness in a hospital cannot be overemphasized," comments Mr. Calvin M. Butler, architect of the new wing. "In this instance, the transformers are installed next to the surgical and X-ray rooms where the loud humming often associated with transformers would have disturbed both doctors and patients. The Westinghouse dry-type transformers used here are practically noiseless. No decibel reading whatever can be obtained, even when a meter is placed on the transformer surface."

"In addition to their virtually silent operation," adds Mr. Archie W. Brown, consulting electrical engineer, "these transformers provide a greater margin of safety for overloads and operation in higher ambient temperatures. Yet they are smaller than others designed for the same kva output."

Quiet operation of the DS-3 is assured by use of a new "built-in" mechanical vibration dampening system, which floats core and coils independently of base, case and connecting conduit.

Reduced size—up to 11%—and weight—up to 32%—achieved by use of two Westinghouse exclusives: inorganic Silclad insulation and grain-oriented Hipersil® steel cores.

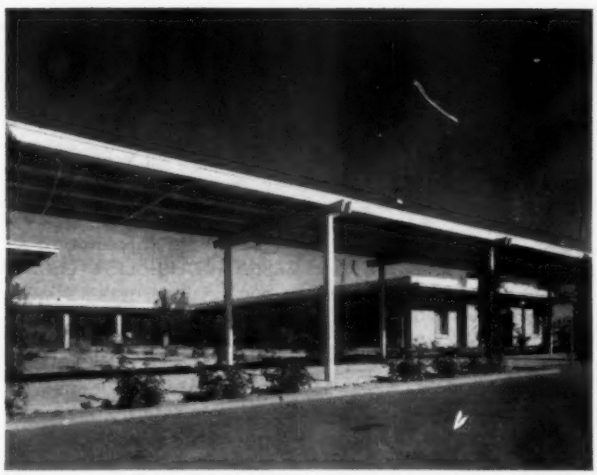
For full information on the advantages of the DS-3 transformer, call your local Westinghouse salesman or distributor . . . or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-70802

YOU CAN BE SURE...IF IT'S

Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV MONDAYS



MODERN APPEARANCE of St. Luke's Hospital in Phoenix is matched by the modern performance of Westinghouse DS-3 transformers inside. This is only one of over 30,000 trouble-free installations of "virtually silent" Westinghouse dry-type transformers. Guaranteed quiet by sound testing every transformer in an ambient of 24 db.

Rigid conduit can be used for the DS-3, with no noise transmission from core and coils. Mr. G. C. Parker, Westinghouse representative, "sound tests" this unit, gets no reading above room ambient even with meter on transformer surface.

For more facts circle 558 on Reply Card

When It Comes to Humidification . . .

Here is some information to consider:

Automatic Armstrong Steam Humidifiers give large humidifying capacity at low cost —by discharging clean, dry steam directly into room atmosphere, or into the air stream in ducts or plenums. Control is by accurate humidistats. Connections are made directly into steam supply and return lines, and to 110 or 220 volt electrical circuits.

Pneumatic controls also are available.

Advantages of Armstrong Steam Humidifiers

1. Uniform, Accurate Control. Armstrong Steam Humidifiers give humidity control throughout the room to within 2 to 4% of humidistat setting.

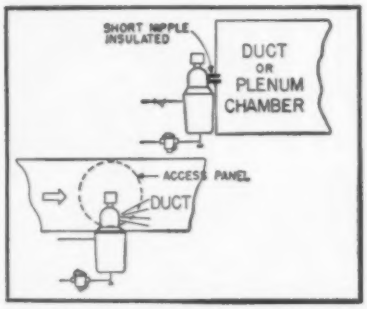
2. No "Fall-out" of Water or Mineral Dust. No water droplets come out of an Armstrong humidifier because the inner chamber is steam-jacketed to evaporate any condensation. And, dry steam leaves no mineral residue to settle out of the air.

3. Easy to Install. Installation of units is similar to that of unit heaters. For simple duct and plenum installations, see Fig. 2.

4. Dependable Quality, Minimum Maintenance. Fan motor bearings are oilless type . . . never need lubrication. Solenoid coils are glass wound. Valves and humidistats are designed for years of service. Simple, sturdy construction means minimum maintenance.

5. Moderate Initial Cost. Mass production and simplicity of design provide a high-quality unit at a moderate price.

6. Low Operating Cost. The cost of steam for humidification to 50% relative humidity at 70°F. averages no more than 1¢ per 1000 cubic feet of space for a 24-hour day. And the load on the boiler is no greater than the heating load required to evaporate a water spray. The cost of electricity for the fan is as little as ¼ cent per day where the rate is as high as 3 cents per kilowatt hour.



Duct and plenum chamber installations

TYPICAL HUMIDITIES FOR VARIOUS PURPOSES

Room	*% RH*
Offices (Health & Comfort)	35-45
IBM Rooms	50
Paper Fabricating & Storage	40-50
Wood Processing	35-50
Leather Storage	40-60
Static Control	50
Food Storage	35-90
Printing Pressroom	45-55

Types Available

ELECTRICALLY OPERATED:

Types C-2 and C-3—These two humidifiers are identical except for size and capacity. The C-2 lists at $170 complete (with fan, humidistat, strainer and steam trap); its capacities for various conditions are listed in the table below. The C-3 (list price $295 complete) has a capacity more than double that of the C-2.

Type VC-2 and VC-3—Similar to C-2 and C-3, but without fans, relying on the velocity of the steam jet for dispersion. At pressures from 5 to 15 lbs. a venturi nozzle is provided. VC-2 lists at $145, VC-3 at $259.50.

Type MC-2—This unit is not automatic, having a manual shut-off valve. List price is $105.25 with venturi, $132.75 with fan.

Type CK-4—A large capacity unit for connection to central heating ducts or large floor-type unit heaters. Automatic humidistat control. Capacity is 6 to 16 times as great as the C-2, depending on pressure. List price is $545.

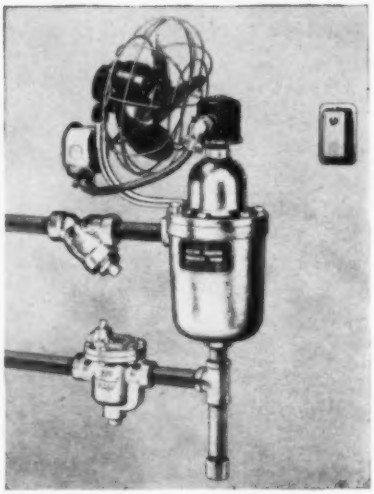
AIR OPERATED AND CONTROLLED:

Types DA-32, DA-33 and DA-34—just like the C-2, C-3, and CK-4, but with pneumatic humidistats and air-operated valves.

C-2 CAPACITIES

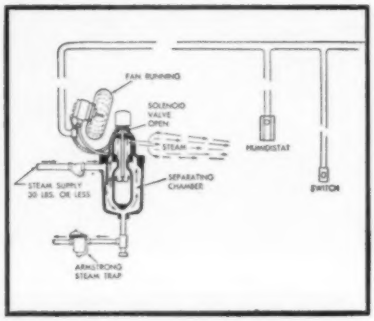
(Maximum cubic feet of space humidified by one Armstrong C-2 Humidifier at 75°F indoor temperature and 0°F, 75% RH outdoors—2 air changes per hour)

Steam Pressure At Humidifier	Humidifier Capacity Lbs./hr.	Relative Humidity To Be Maintained							
		35%	40%	45%	50%	55%	60%	70%	80%
5	42	49,000	43,000	37,000	33,000	30,000	27,000	23,000	20,000
10	60	70,000	61,000	54,000	48,000	43,000	39,000	33,000	29,000
20	65	77,000	66,000	58,000	52,000	47,000	42,000	36,000	31,000
30	76	90,000	77,000	68,000	60,000	54,000	50,000	42,000	36,000



HOW THEY WORK

When relative humidity drops slightly below desired level, humidistat activates solenoid valve, which admits steam into separating chamber and thence to room atmosphere. Fan helps disperse steam. When relative humidity reaches desired level, humidistat closes valve and stops fan.



For Details, Prices and Assistance

Your local Armstrong Representative will be glad to give you complete details and prices, and help you survey and plan your humidification job—at no cost or obligation on your part. Or you yourself can make the survey, with the help of information given in Armstrong Bulletin 500.

For Complete Information

SIXTEEN-PAGE BULLETIN NO. 500 contains a wealth of information about humidification. Tells: how relative humidity affects products and your profits . . . other effects of relative humidity . . . recommended humidities for various operations . . . advantages of Armstrong Steam Humidifiers . . . how present users have profited . . . complete data and prices on all Armstrong humidifiers . . . selection and installation data. To get your copy, just call your local Armstrong Representative or write:

ARMSTRONG MACHINE WORKS
9128 Maple Street
Three Rivers, Mich.

For more facts circle 559 on Reply Card

Skyline Advertising with . . .

WATERSPHEROID®

A sound investment in Plant Security and a Landmark of company progress . . .

Big Brother to the Watersphere®, the Horton Waterspheroid is engineered to provide dependable gravity pressure for plant water and/or sprinkler reserves in capacities up to 500,000 gallons.

Whether your water requirements are large or small, a graceful Horton structure can complement both the utility and the beauty of your modern plant by:

(1) Saving up to 60% in fire insurance premiums.

(2) Providing the promotional benefits of *skyline advertising.*

Write our nearest office for descriptive literature on the Watersphere or the Waterspheroid.

250,000-gallon Waterspheroid graces the skyline above Automatic Electric Company plant at Northlake, Illinois. Provides reserves for sprinkler system and plant water. Furnished through The Austin Company.

Chicago Bridge & Iron Company

Atlanta • Birmingham • Boston • Chicago • Cleveland • Detroit • Houston • Kansas City (Mo.)
New Orleans • New York • Philadelphia • Pittsburgh • Salt Lake City
San Francisco • Seattle • South Pasadena • Tulsa
Plants in Birmingham • Chicago • Salt Lake City • Greenville, Pa. • New Castle, Delaware

SUBSIDIARIES:
Horton Steel Works Limited, Toronto; Chicago Bridge & Iron Company Ltd., Caracas;
Chicago Bridge Limited, London; Chicago Bridge Construcoes Ltda., Rio de Janeiro

REPRESENTATIVES AND LICENSEES:
Australia, Cuba, England, France, Germany, Italy, Japan, Netherlands, Scotland

E61C

BASIC MODELS

Model 640—Unit Bench

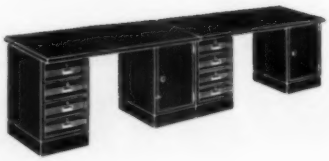
One bench top (steel, Presdwood-covered steel, laminated wood or ShopTop). One 4-drawer pedestal unit. One cabinet unit with adjustable shelf. Two bases.

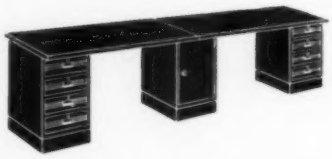
Model 643—Unit Bench

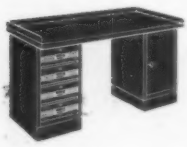
One bench top (steel, Presdwood-covered steel, laminated wood or ShopTop). Two 4-drawer pedestal units. Each drawer glides on roller bearings, has individual cylinder lock and flush pull. Two bases.

Model 646—Unit Bench

One bench top (steel, Presdwood-covered steel, laminated wood or ShopTop). Two cabinet pedestal units. Each has adjustable shelf, chrome plated locking handle. Two bases.







Space Engineering with Standard Hallowell Shop Equipment

Typical installation of HALLOWELL unit work benches. They can be set up in continuous line, back to back, or singly in shop, lab, toolroom or on assembly line.

makes it easier, faster and more economical to outfit an area and rearrange it to meet changing requirements

Space engineering with standard HALLOWELL Shop Equipment overcomes all the disadvantages of specially designed and custom-built equipment. Its cost is only a fraction that of custom-built units. It is easy to order and get from leading shop equipment dealers; can be set up fast; can be quickly rearranged to meet changing requirements; and is extremely versatile. Standard HALLOWELL interchangeable accessories (backboards, end pieces, top shelves, wire-mold sections, electrical panels, testing panels, and storage wall units) can be added as needed to increase the usefulness of this equipment.

Ask the authorized dealer nearest you for complete information on the standard HALLOWELL line of work benches, shop desks, stools and chairs, tool stands, cabinets, storage walls, shelving. Write Columbia-Hallowell Division, STANDARD PRESSED STEEL CO., Jenkintown 26, Pa.

SPS **Jenkintown • Pennsylvania**

Standard Pressed Steel Co. • The Cleveland Cap Screw Co. • Columbia Steel Equipment Co. • National Machine Products Co. • Nutt-Shel Co. • SPS Western • Standco Canada Ltd. • Unbrako Socket Screw Co., Ltd.

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COURT DECISIONS —a summary of legal findings of interest to the plant engineer

Prepared by Albert Woodruff Gray

Price Cutting

CHARGES OF price cutting and violations of the antitrust laws were made by a competitor against a Texas manufacturer of concrete cinder building blocks. It was claimed by this competitor that the blocks of the manufacturer were sold to purchasers in New Mexico at prices lower than those charged by it in Texas for the purpose of destroying competition.

From a judgment, absolving the Texas manufacturer of wrong doing or violation of the federal antitrust laws, the competitor appealed. In affirming that judgment the United States Court said,

"The Clayton Act, as amended, does not have the effect of making any and every differential in price in various areas illegal price discrimination within the intent and meaning of the Act. The Act concerns itself with price discrimination which is reasonably calculated to lessen competition or tends to create a monopoly or to injure, destroy or prevent competition with any person who either grants or knowingly receives the benefits of discrimination of that kind or with customers of both of them." Court brief 251 Fed. 2d 7, New Mexico.

Employment to Design

HIRED AS superintendent by a Missouri plow manufacturer, the employee devoted himself for three years to the improvement of agriculture implements.

In the last year of his association with that employer, he devised and patented an iron sulky plow. Later, after the employee had left this employment and been granted a patent on his invention, the plow company sued to compel an assignment by him of this patent.

He was not hired, however, to use his inventive faculties for the benefit of his employer. Here the court held that there was no ground for the inference that he was supposed to do so. Further, any right of the employer in this invention under the employment contract was "a naked license to make and sell the intended improvement as a part of its business, which right, if it existed, was a mere personal one and was not transferable."

In its decision, the New York Court said: "Employment merely to design or to construct or to devise methods of manufacture is not the same as employment to invent.

"The general rule is that in the absence of an express agreement by an employee to give his employer the benefit of the employee's inventive genius, the employer has no interest in the patents issued to said employee, even though it can be said that his inventive power was stimulated by knowledge necessarily derived from his employment." Court brief 119 U. S. 226.

Metal Plant a Nuisance

COMPLAINT WAS made by a resident of New Orleans, Louisiana, of the loud and irritating noises of a nearby metalworking plant between seven o'clock in the evening until the following morning. The house owner maintained the plant was an illegal nuisance and asked the court for an injunction against the continuation of this disturbance.

In granting the injunction against the operation of this plant in the nighttime, the court said, "It is well settled that noises attending matters of public convenience and necessity, common to all inhabitants of the community, which cannot be readily abated without injuring the public generally, cannot be likened to noises created by private business for private purposes not common to all and that can be abated.

"Since both these parties have the right to use their respective properties in accordance with the law, these residents to use theirs for residential purposes and the manufacturer for industrial purposes, each must use his property so as not to prevent the reasonable use by the other.

"To permit this manufacturer to continue emitting screeching, grinding noises intermittently at nighttime indefinitely, five nights a week, would deprive these residents of their right to use their property. Of course, use of property in municipalities is governed by police regulation but even the police regulation cannot permit one private owner to maintain a nuisance to the detriment of another." Court brief 97 So. 2d 685, Louisiana.

Misuse of Patent

BASED ON THE charge of a monopoly of the concrete block machine industry, suit was brought against a group of manufacturers, claiming they were members of this conspiracy. In its decision that the acts of these manufacturers constituted a violation of the antitrust laws, the federal court in Michigan said,

"When two closely related corporations have 65 per cent of the dollar value of the industry and the balance is divided between over 50 other manufacturers with the nearest competitor having less than 8 per cent of the whole, we believe that such a combination is to all intents and purposes a monopoly within the meaning of the law."

During the activities of this combination a small, independent manufacturer had undertaken the production of an inexpensive concrete block machine. With no manufacturing facilities of his own, this producer contracted the fabrication of his machines to an independent plant.

In the leading concrete block industry magazines advertisements appeared stating that the members of this combination were the only licensees under these patents with the warning that purchases elsewhere might be the subject of patent infringement charges.

The court said, in awarding the

COURT DECISIONS

threefold damages to the independent dealer:

"At the time these producers started their campaign to destroy this dealer's business, that company had acquired some good will and going concern value. Where the wrong itself is of such a nature as to preclude ascertainment of the amount of damages with certainty, it would be a perversion of fundamental principles of justice to deny all relief to the injured person and thereby relieve the wrongdoer from making any amends for his acts." Court brief 147 Fed. Suppl. 376, Michigan.

Permanent Employment

UNDER AN oral agreement, a mechanical engineer was engaged for permanent employment by a Chicago manufacturer and assigned to the supervision of resistor production. By this agreement he was to make these cold molding resistors, develop the molding devices and be plant manager in exclusive charge of these operations.

When at the end of the year he was told that the company had decided to discontinue this process, he sued for damages for the breach of what he claimed was a contract for permanent employment.

"It is apparent," said the court, "that if there was a contract of any character it was of nebulous substance only, with absolute uncertainty as to duration and with lack of mutuality of promises upon the parts of the respective parties. In that situation it seems clear, first, that the contract was void for lack of mutuality and second, that if any agreement existed it was one wholly at will which either party had the right to terminate at any time.

"The employee never agreed that he would continue in the employment for any specified time. In other words, he had the right to terminate his employment at any time and did not promise to perform for any definite length of time. Therefore the contract could not have been enforced against him and was lacking in mutuality. Consequently he cannot enforce it against the employer." Court brief 222 Fed. 2d 347, Illinois.

Royalty Payments

UNDER A CONTRACT made by a tool manufacturer with an employee who had invented a chain saw, 2½ per cent of the net sales price was paid the employee by the company for an assignment of the patent to the company. The Federal Government contended these payments were ordinary taxable income. On the other hand, the employee maintained they were taxable as capital assets.

The contention of the government was sustained by the federal court. "Under the taxpayer's employment contract he was required to assign to the company any patents he obtained covering his work for the company," said the court. "The ownership of the taxpayer's inventions and the payments obtained thereon was clearly vested in the company and the patents could not be the subject of a sale by the taxpayer. The commission payments were intended, not as part of the sale price of the patents but as additional compensation to the taxpayer and as such constituted ordinary income." Court brief 183 Fed. 2d 281.

Malicious Prosecution

CHARGES WERE filed by a machinery corporation against three employees. The company asserted that these men had conspired to steal company trade secrets. The three men were indicted by the grand jury and found guilty but the conviction was later set aside and the indictment dismissed by the appellate court.

Upon the reversal of this conviction, suit was brought by one of the accused employees against the company for malicious prosecution. In reply to the assertion that the conviction of this man in the lower court, irrespective of the fact that the conviction was already set aside, established probable cause for the acts of the manufacturer, the court said,

"It is commonly held that the conviction of the accused by a tribunal to which the complaint was made, although reversed on appeal, conclusively establishes the existence of the probable cause. The record indicates that this man was convicted of the conspiracy to steal trade secrets. However we believe that the finding of guilt does not establish probable cause where the prosecution is subsequently dismissed and states no offense." Court brief 156 F.S. 46, Massachusetts.

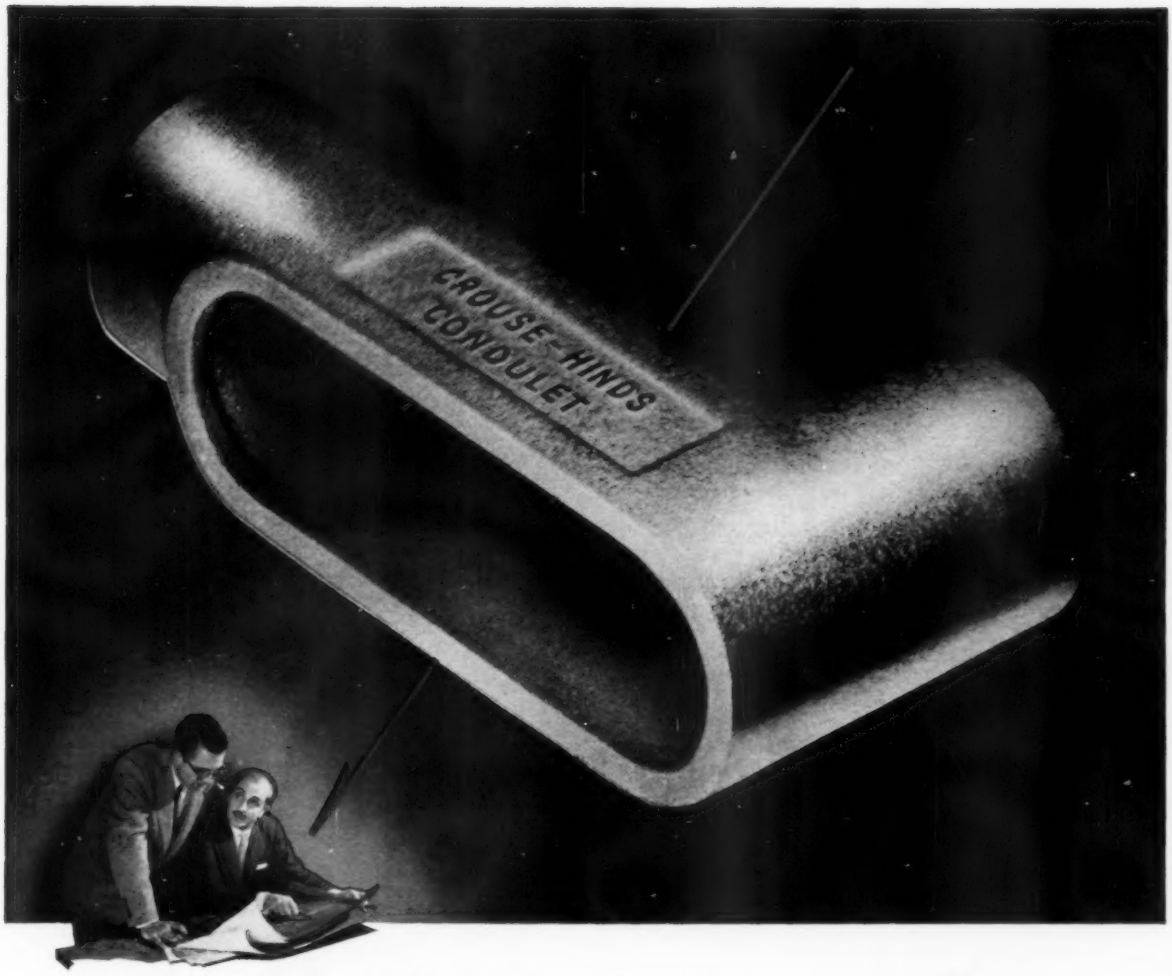
Trade Secrets

PLANS FOR THE construction of freight containers to facilitate both shipping and shore handling of cargoes were conceived by a ship builder. These containers were equipped with doors at one end large enough for a man to enter. Each container had collapsible legs that permitted locking the container to the deck of a ship and to other containers when stacked. In addition they were equipped with eyelets for a specially designed hoist for handling.

In negotiations for the manufacture of these containers, the plans for their construction were disclosed in confidence to others. When these plans were appropriated by these competitors to whom they had been thus disclosed, suit was brought by the ship builder for damages.

In its award of judgment against the misappropriation of these ideas, the federal appellate court said, "Confidential business information is not given protection as a reward to its accumulator. If the creator is entitled to reward it is available to him in the patent and copyright statutes. Instead our function is that of condemning the employment of improper means to procure the trade secret.

"It is unquestionably lawful for a person to gain possession through proper means of his competitors product and through inspection and analysis create a duplicate unless, of course, this item is patented. But the mere fact that such lawful acquisition is available, does not mean that he may through a breach of confidence gain the information in usable form and escape the efforts of inspection and analysis." Court brief 97 U.S.P.Q. 98, Illinois.



Now, more than ever, engineers specify: "CONDULETS*... or approved equal"

After 51 years of use in every conceivable application, Condulets remain the standard of quality for rigid conduit fittings.

It's not hard to see why. Pick up any Obround Condulet, for example, and note such features as these:

TAPER TAPPING: Condulet threads are taper tapped to match tapered conduit threading . . . giving you a rigid joint that will not loosen . . . insuring *permanent* ground continuity!

INTEGRAL BUSHING: A smooth, rounded, burr-less surface that protects wire insulation.

WEDGE NUT COVER FASTENER: This exclusive Crouse-Hinds feature is part of the cover itself. Screws can't fall out. No screw holes to locate. No protruding screw hole ears to damage cable.

LONGER HUBS: Conduit can be tightened completely without bottoming on integral bushing. And there's generous surface space for good wrench hold.

MATERIAL: Feraloy, a special alloy that is strong and tough, resists corrosion . . . gives sharp, full threads.

FINISH: A triple-layer treatment that exceeds Federal and U.L. specs for longer-lasting protection.

Where else can you find all (or even *most*) of these features? You *can* find them all in each of the 45 types of Obround Condulets . . . sizes ⅛" to 6".

There is a type for every need, including a wide selection of interchangeable covers and wiring devices. Just call your Crouse-Hinds distributor and ask for "Condulets!"

*CONDULET is a coined word registered in the U.S. Patent Office. It designates a product made only by the Crouse-Hinds Company.

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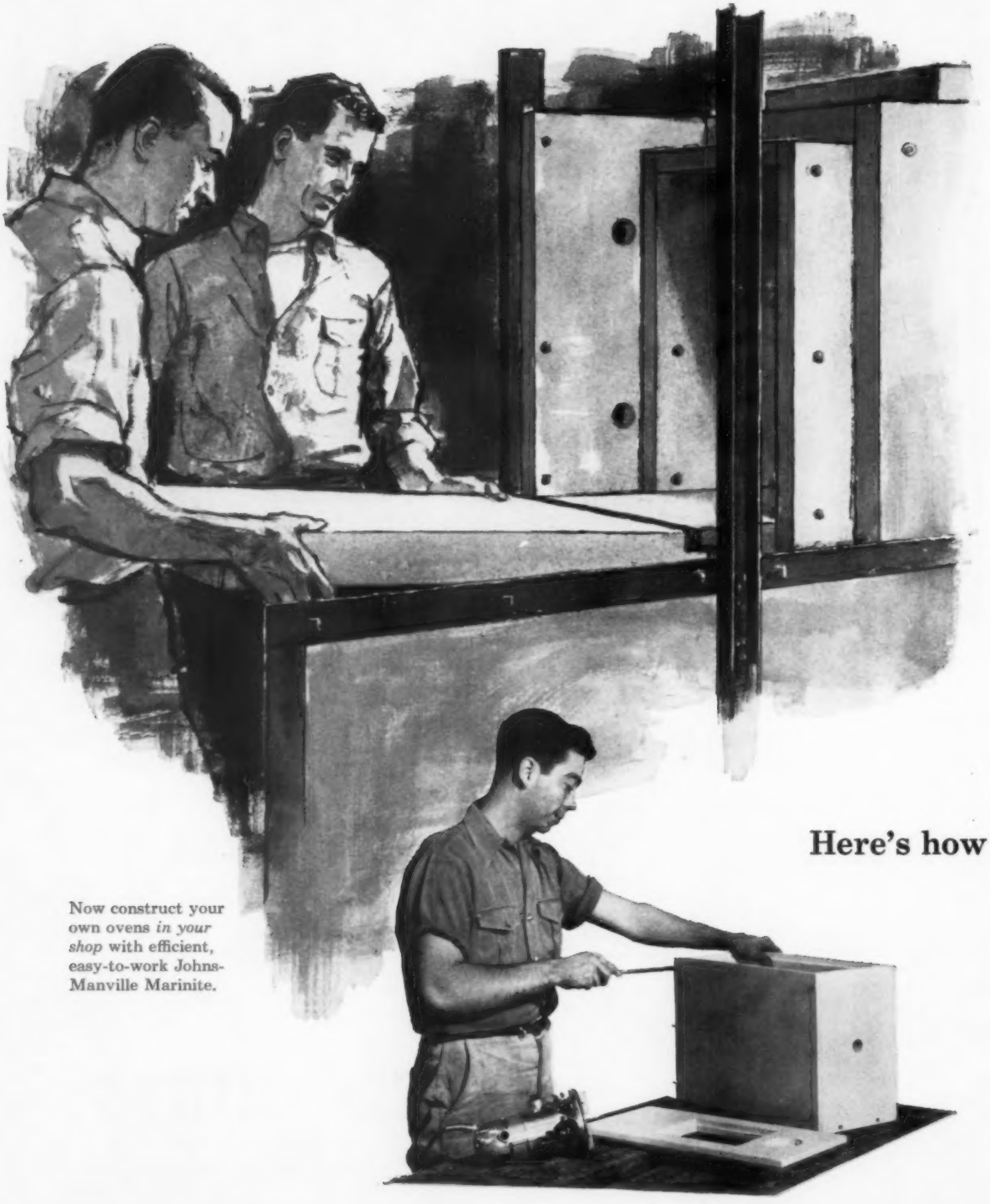
For more facts circle 562 on Reply Card

J-M Marinite®...



Here's how

Now construct your own ovens *in your shop* with efficient, easy-to-work Johns-Manville Marinite.

fast, new way to oven economy

. . . easy to fabricate . . . easy to maintain . . . builds and insulates in one operation

If downtime and costs are delaying needed oven changeovers—or installation of new ovens—in your plant, here's big news: Johns-Manville Marinite, made of asbestos and diatomaceous silica, can show you the way to build your own high-efficiency oven *in your own shop* at low cost.

Get these important savings

When you build your oven with Marinite, you eliminate the need for linings and outer facings, because Marinite is *both* an efficient insulation *and* a structural board. Your shop can prefabricate oven panels from large 4′ x 10′ sheets with standard saws and drills—assemble them quickly with a minimum of structural support.

Cut maintenance to the minimum

Marinite ovens last indefinitely with little or no maintenance. Made of asbestos fiber, diatomaceous silica and an inorganic binder, Marinite never rusts, rots or corrodes . . . is completely unaffected by moisture condensation during cyclic shut downs. A rigid, homogeneous material, Marinite eliminates "hot spots" caused by soft insulations that settle and sag in service.

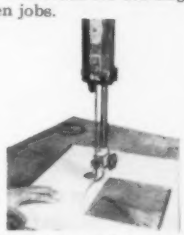
Change over with Marinite now for new oven efficiency

Don't put off your oven changeover another day. With Marinite's low conductivity, you can add new efficiency to your oven at unmatched low cost. And you'll find Marinite cuts heat loss so effectively that areas directly adjacent to ovens become usable, comfortable work areas.

Marinite now carries Underwriters' label

Marinite-23, 36, and 65 now carry Underwriters' Laboratories label for: *zero* flame spread; *negligible* fuel contributed; *zero* smoke developed (based on 100 for untreated red oak). For information write Johns-Manville, Box 14, New York 16, N. Y. In Canada, Port Credit, Ontario.

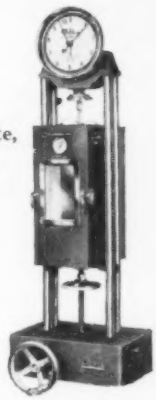
Large Rigid Sheets, up to 4′ x 10′ make Marinite the ideal material for the largest oven jobs.



Workability of Marinite can help you cut oven costs downtime by fabricating and assembling your own ovens.

W. C. Dillon & Co. uses Marinite for easy assembly and close temperature control

W. C. Dillon & Co., Inc., Van Nuys, California, makers of scientific instruments and temperature control cabinets for materials testing, uses Marinite to maintain precise temperature *and* to present a clean, trim appearance. "We would certainly recommend Marinite to any concern interested in *cutting costs and in producing a fine piece of finished equipment*," says Robert E. Dillon, V. P.



Made of Marinite, Dillon cabinets maintain precise temperatures for materials testing.

JOHNS MANVILLE JM PRODUCTS

JOHNS-MANVILLE
Insulations
FOR LASTING THERMAL EFFICIENCY

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DIAMOND "FIRSTS"

in the development of Roller Chain

FIRST TO PRE-LOAD PRODUCTION ROLLER CHAIN

Pre-loading seats pins, bushings and linkplates; takes out initial stretch.

FIRST TO STUDY FATIGUE

First to make design changes in roller chain parts for improved fatigue resistance.

FIRST TO BALL DRIFT

Pitch holes in DIAMOND chain sideplates are ball drifted for greater fatigue resistance—(DIAMOND patent).

FIRST TO EMPLOY SEAM RELIEF BUSHINGS

OIL RESERVOIR

Seam relief bushings in roller chain reduce run-in time and provide better lubrication—(DIAMOND original patent).

FIRST TO PROPERLY PLACE BUSHINGS

Bushing seams on DIAMOND roller chain are always placed *away* from load-bearing area for improved resistance to wear and fatigue.

FIRST TO SHOT PEEN

DIAMOND chain parts . . . rollers, bushings, linkplates and pins . . . are shot peened for greater fatigue resistance.

DIAMOND Roller Chains are the product of more than sixty-eight years of specialization in the manufacture of high endurance roller chain. Some of the quality features developed and pioneered by DIAMOND are considered "extra" or "premium" features in other chains. These are standard in DIAMOND Roller Chains . . . and have been for years. DIAMOND will continue to improve the capabilities of its product, assuring you *always* of a thoroughly dependable chain with superior operating characteristics.

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DIAMOND Distributors have all types and sizes of Roller Chain *in stock*, ready for instant delivery. Look under "Chains, Roller" in the Yellow Pages of your Telephone Directory . . . or write to factory for catalog and name of your nearest distributor.

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DIAMOND **ROLLER CHAINS**

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WHAT'S JUST AHEAD IN THIS ISSUE?

- VERSATILE THERMISTORS can be used to detect moisture, indicate and control temperature. They will also keep watch on your motor bearings, provide adjustable time delays and make excellent liquid level controls. To see how these simple circuits can help you, turn to the next page.

- KEEPING THE right amount of maintenance stores in the stockroom is the answer to successful stores control. It's all in knowing when to order and how much. To find out how, read the article on page 90, which also includes a re-ordering chart which will tell you what the economical quantity should be for a particular item.

- WITH THE increased use of tracers and other radioactive materials in industrial plants and laboratories, the possibility of stream and public waters contamination becomes greater. In order to protect his company against even untrue charges of such contamination, it behooves the plant engineer whose company uses such radioactive materials to keep complete records of radioactivity levels in plant effluent. The equipment and methods one authority uses for this job are explained in the article starting on page 98.

- WHEN PLANNING a V-belt drive, one must understand the effects of belting on the driven motor and know how to specify motors for belted service. If you are interested in the intricacies that are not explained in the handbooks on these subjects, you will want to read "How To Specify and Apply A-C Motors to V-Belt Drives," which starts on page 102.

- BEEN WONDERING what makes the insides of your pumps look like miniature Grand Canyons? Abrasion and corrosion can do a lot of damage to pump impellers and housings, and it's sometimes hard to decide where to place the blame. Starting on page 106, our authors have presented pictures that you can compare with your pump "innards," to help diagnose pump damage.

- MAINTENANCE painting should be planned to get the best results. Surface preparation, paint selection and proper application are all important. Du Pont set up a Protective Coating Committee to study their present procedures to see how they could be improved. To learn what they did, turn to page 113.

- WIRE ROPE slings are handy gadgets to have around the plant. Actually, they are basic tools that should be properly stored, cared for and handled. With proper attention they'll pay dividends in longer life, safety and better load handling. For some tips on slings, turn to page 118.

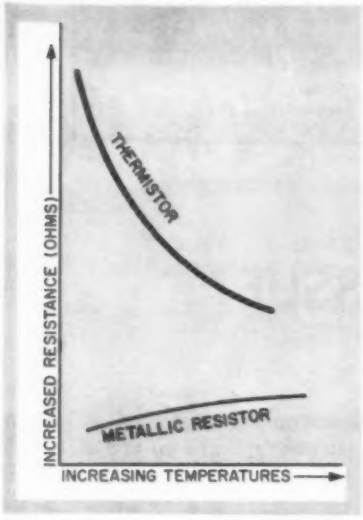


Fig. 1. Resistance of Thermistors changes with increasing temperatures.

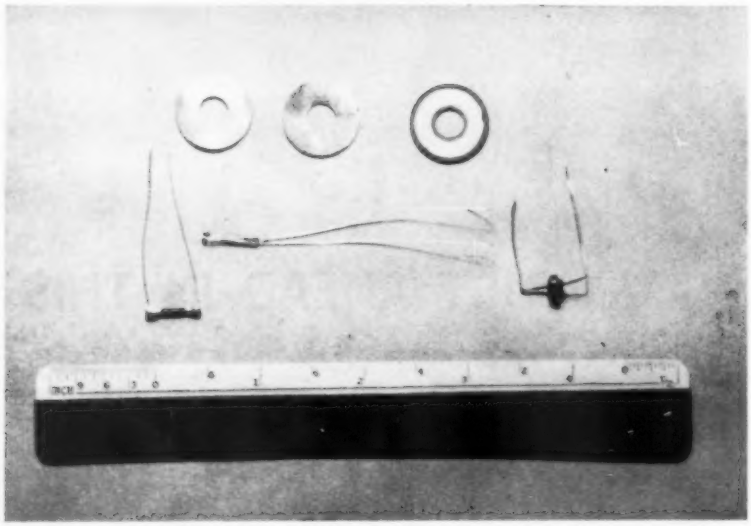


Fig. 2. Thermistors are made in a variety of forms depending upon the application. Mixtures are fired at high temperatures and produce a stable material.

SIMPLE THERMISTOR APPLICATIONS
Solve Many Industrial Control Problems

By HOWARD T. BAILEY, Electrical Engineer, Universal Foundry Co., Oshkosh, Wis.

UNDERSTANDING circuit applications of Thermistors can go a long way towards solving some of those elusive industrial control problems. As an example, consider the problem of putting the right amount of water into sand to hold the moisture content precisely at 3.8 per cent. If the sand is hot, additional moisture is required and this is where the Thermistor takes over.

Sensing the radiated heat from the hot sand, the Thermistor is connected into the circuit so that the decrease in resistance, due to the higher temperature, causes additional water to enter the sand mix. The additional water has a cooling effect on the sand. Sensing this change, the Thermistor's resistance increases to the point where the water is cut off.

Other useful applications of the Thermistor around the plant include liquid level controls, temperature control and measurement, time delay relays, switching, voltage stabilizers and moisture controls.

Thermistors are highly sensitive to minute changes in temperature and unlike resistors, have a negative coefficient of resistance, Fig. 1. If a small voltage is applied to a Thermistor, Fig. 2, the current which flows will be proportional to the applied voltage in accordance with Ohm's law. This will

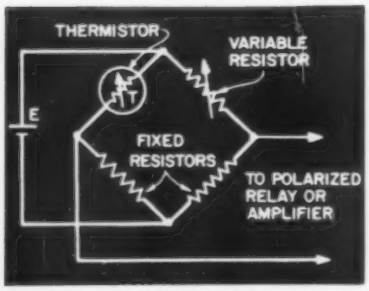


Fig. 3. Temperature controller with high sensitivity made with a Thermistor.

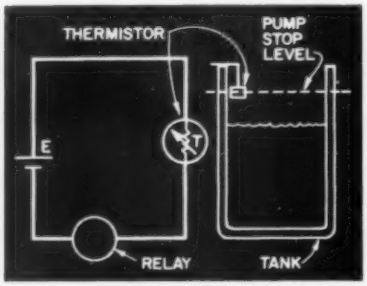


Fig. 4. Heat loss through water is principle of operation of this level control.

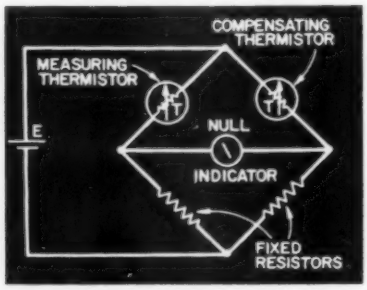


Fig. 5. High resistance Thermistors are used in accurate temperature indicator.

hold true as long as the power dissipated in the Thermistor is small enough so that the temperature of the unit is not raised measurably above its surroundings.

As the current is increased, the power dissipated within the Thermistor raises the temperature of the unit, causing a decrease in resistance and consequently greater current flow. This results in still more heat and a further reduction in resistance.

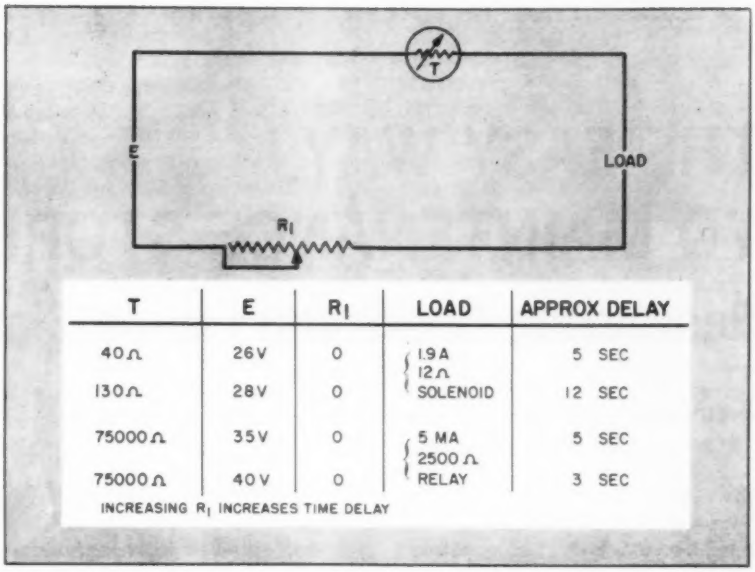
Principal uses of Thermistors depend upon this extremely large change in resistance with very small change in temperature.

One type of Thermistor material is composed of oxides of manganese and nickel and has a temperature coefficient of resistance that is extremely high. Comparatively low temperature coefficients are obtained with the addition of cobalt to the mix.

Large Thermistors will take much longer to increase in temperature with a given power dissipation than a very small Thermistor. If a Thermistor is placed in series with a fixed resistance and a voltage source, the initial current will be determined by the cold resistance of the Thermistor, the resistance in series and the applied voltage.

As current flows through the circuit, the temperature rises, reducing the resistance of the Thermistor until the maximum temperature available from the power input is reached.

The time required for the current to go from minimum to maximum will depend upon the thermal mass of the Thermistor. This effect is very useful in time delay circuits and can be designed for periods from a few milliseconds to several minutes, through proper selection of circuit components.



T	E	R_1	LOAD	APPROX DELAY
40Ω	26V	0	1.9A 12Ω SOLENOID	5 SEC
130Ω	28V	0		12 SEC
75000Ω	35V	0	5 MA 2500Ω RELAY	5 SEC
75000Ω	40V	0		3 SEC

INCREASING R_1 INCREASES TIME DELAY

Fig. 7. Time delay circuits using Thermistors have many operating advantages.

Temperature controllers are easily constructed using the bridge circuit shown in Fig. 3. Accuracies of 0.001 degree can be obtained and the operating point is readily adjustable.

Liquid level controls operate on the principle that the Thermistor will reach a higher temperature with a given power dissipation in air than when immersed in a liquid. When the cooling liquid reaches the Thermistor, the temperature of the unit will drop sharply, increasing its resistance and operating a relay to stop the pump motor, Fig. 4.

Since the resistance of a Thermistor is an exact and reproducible function of the temperature, it makes an ideal device for temperature measurement purposes. High precision temperature measurements can be made with the bridge type circuit shown in Fig. 5. High resistance Thermistors should be used so that the bridge leads do not affect the readings.

Tiny bead Thermistors can readily be built into journal boxes, motor bearings or any rotating part and will faithfully indicate the operating temperature of the part at a remote point. This simple circuit is shown in Fig. 6.

There are numerous applications of the time-current characteristics of the Thermistor. This delayed action can be utilized to introduce a time delay into the operation of relays and other electrical devices without the use of timers. Delay characteristics depend upon the Thermistor selected, circuit constants and operating conditions. Time delay circuits and circuit components are outlined in Fig. 7.

Stabilizing fluctuating voltages is often a problem faced by the plant engineer. Thermistors can be used, Fig. 8, to stabilize output voltages in circuits where there is a considerable range of input voltages. If a suitable value of resistance is placed in series with the Thermistor, the voltage across the combination can be maintained almost completely independent of current over a wide range. **End**

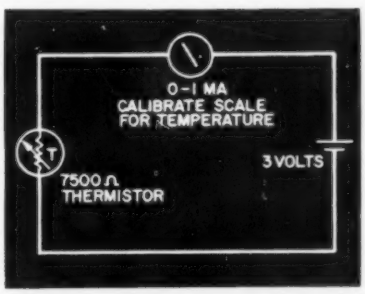


Fig. 6. Bearing temperature indicator is readily made with a rugged Thermistor.

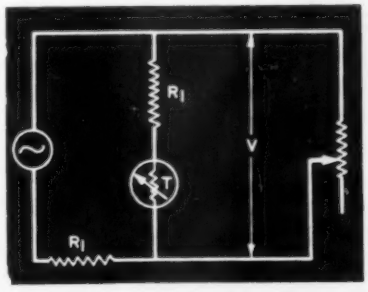


Fig. 8. Thermistor voltage stabilizing circuit produces steady output voltages.

THE EASY WAY TO MAINTENANCE STORES CONTROL

Reordering Chart and Forms Simplify the Job

By TOM MOSTYN, Executive Staff Maintenance Engineer, Rayonier, Inc.

IN SETTING UP a maintenance stores control system we will first have to answer the question: "What are we trying to accomplish and how should we go about it?"

The definition will vary according to circumstances, but in any case must include the following essentials to minimize total plant operating costs:

1. A definition of what items are to be controlled in stores.
2. A means of positively identifying each item, and its location in stores.
3. A method of knowing when to reorder and how much to reorder.
4. A definite procedure for controlling stock levels.

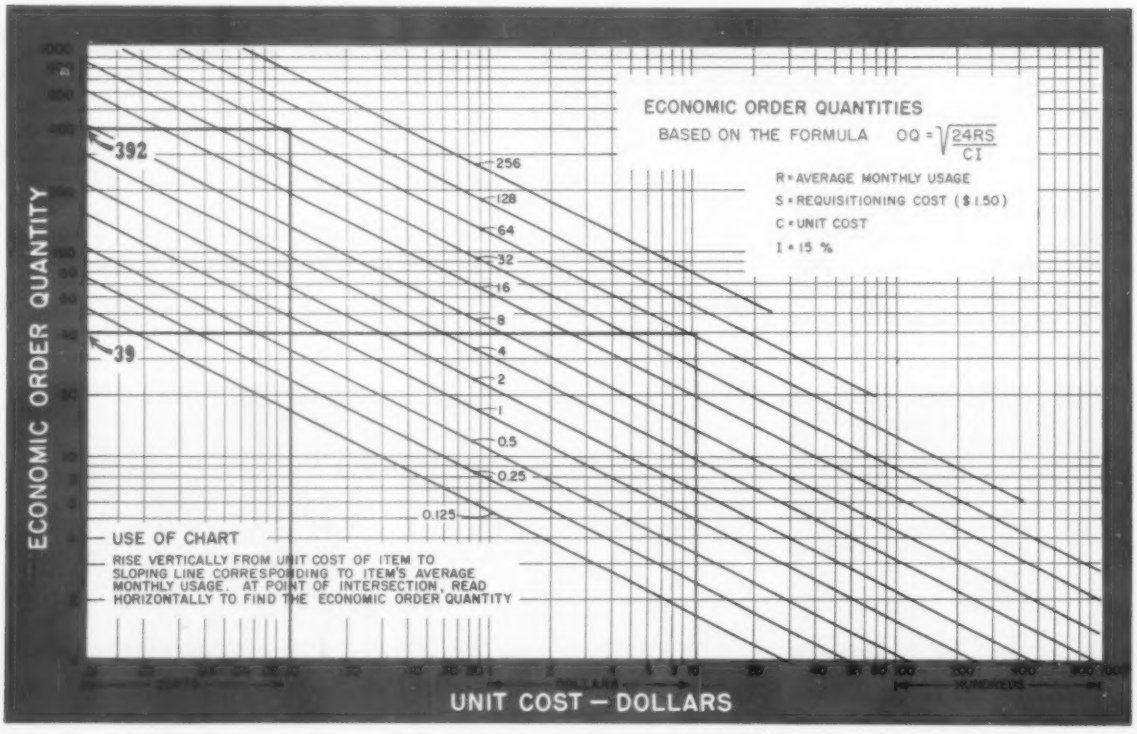
Here is a brief description of each of these points and how they are being handled in our plant.

What is stores?—All stock items at Rayonier must fit one of two definitions:

1. Regularly needed supplies for plant maintenance.
2. Critical parts of critical machines for which there is no standby equipment or other protection against extended production delays.

Stores stock does not include special materials bought for projects and planned maintenance, or tools, or plant raw materials, or miscellaneous equipment that has no foreseeable use.

This chart is helpful in finding the correct quantity to order for minimum operating and storage costs. Colored lines show how you can eliminate all the mathematics shown on the opposite page which would be necessary when reordering.



Project materials and tools are kept physically separate from stores stock by the storeskeeper under a separate control. Production supplies are a separate responsibility, physically separate from maintenance stores. Salvageable items are kept in a salvage area, requisitioned by the storeskeeper as replacement to stock. Junk is kept in a junkyard.

In other words, stock items are limited, by definition, to items that are regularly needed and actual turnover, or critical replacements for specific critical machines. It is the storeskeeper's responsibility to keep all "dead" items out of his stock.

What is in stores? — Positive identification of each item is important in maintenance stores control. The key to identification is a good workable stock numbering system. Duplication of stock and much confusion can be avoided by arranging stock numbers in a logical sequence.

Part nomenclature should be consistent. Specifications should include all information needed by purchasing to reorder. A stock catalog should be kept current of all stock items for reference in engineering, maintenance and production departments. A file of locator cards giving physical location of all stock can save much time hunting for seldom used items. Inventory cards, filed by location (sequence in bins) can facilitate taking annual inventory.

Part identification can be the biggest bugaboo in a poorly organized storesroom. Identification of spare parts can be the most time-consuming phase of getting a poorly organized storesroom under control.

Setting Stock Minimums

When should an item be reordered?—What should be the minimum number of parts allowed in stock before reordering? The minimum, by definition, is the maximum normal usage of an item during the time it takes to replace the item. Large withdrawals for planned projects are not considered normal usage, unless they recur often. Reasonably low inventories will be attained only if the storeskeeper and maintenance foremen are realistic in setting minimums.

To make the setting of minimums an objective decision based on past demands, a record of maximum withdrawals should be kept in the storesroom. This can be in the form of perpetual inventory, although the posting of each withdrawal is expensive. The same sort of control is attained at Rayonier's Grays Harbor Division by posting only those withdrawals which exceed previous withdrawals. This maximum withdrawal information is posted on a tag at the bin by the counter clerk.

It has been our experience that large single withdrawals are the basis for most minimums. Fast moving items are usually popular items that can be replaced locally. With few exceptions, hard-to-get items are slow moving. Little trouble has been experienced in arbitrarily converting maximum single withdrawals to minimums required during reordering time.

As a check on adequacy of minimums, a list of needed items

Table shows computations for two items—priced at ten cents and $10—based on average usage of 64 per month. Ten cent item justifies ordering six month supply. Less than a month's supply of $10 item is economic order quantity.

ORDER QUANTITY	UNIT COST	REORDERING COST PER YEAR Number of Reorders/Year × $1.50	COST OF INVENTORY PER YEAR Average Inventory × Unit Cost × 15%	TOTAL COST
200	$ .10	12 ÷ 200/64 × $1.50 =$ 5.76	200/2 × $.10 × .15 =$ 1.50	$ 7.26
250		12 ÷ 250/64 × $1.50 = 4.61	250/2 × $.10 × .15 = 1.87	6.48
300		12 ÷ 300/64 × $1.50 = 3.84	300/2 × $.10 × .15 = 2.25	6.09
350		12 ÷ 350/64 × $1.50 = 3.29	350/2 × $.10 × .15 = 2.63	5.92
400		12 ÷ 400/64 × $1.50 = 2.88	400/2 × $.10 × .15 = 3.00	5.88
450		12 ÷ 450/64 × $1.50 = 2.56	450/2 × $.10 × .15 = 3.38	5.94
500		12 ÷ 500/64 × $1.50 = 2.30	500/2 × $.10 × .15 = 3.75	6.05
		(ECONOMIC ORDER QUANTITY 392)		
20	$10 00	12 ÷ 20/64 × $1.50 =$57.60	20/2 × $10. × .15 =$15.00	$72.60
25		12 ÷ 25/64 × $1.50 = 46.10	25/2 × $10. × .15 = 18.70	64.80
30		12 ÷ 30/64 × $1.50 = 38.40	30/2 × $10. × .15 = 22.50	60.90
35		12 ÷ 35/64 × $1.50 = 32.90	35/2 × $10. × .15 = 26.30	59.20
40		12 ÷ 40/64 × $1.50 = 28.80	40/2 × $10. × .15 = 30.00	58.80
45		12 ÷ 45/64 × $1.50 = 25.60	45/2 × $10. × .15 = 33.80	59.40
50		12 ÷ 50/64 × $1.50 = 23.00	50/2 × $10. × .15 = 37.50	60.50
		(ECONOMIC ORDER QUANTITY 39)		

that are out of stock is also maintained by the counter clerk. The number of items on this list is negligible and requires very little of his time. However, it assists the storeskeeper to analyze minimums and his department's ability to give the kind of service maintenance needs.

The cost of understocking is high — production shutdowns or slowdowns — excessive labor and materials costs of substitutions. A constant review of usage of individual items is the only way to attain low realistic minimums without running into high maintenance costs.

How much should be ordered? —Here is the place most storeskeepers fall down. They need a guide. The chart in Fig. 1 is based on a formula which balances the cost of reordering and the cost of storing each item. Total cost is at a minimum.

The cost of reordering must be estimated by considering the time and materials consumed in placing an order on an item (requisitioning, approval, purchase ordering, receiving, racking and accounting). It will vary with different procedures and different supply situations.

Cost of storing is expressed in the formula as a percentage of the investment (interest on investment, insurance, heat-light-rent of stores space, deterioration, obsolescence, etc.). Do not fool yourself on this figure. It usually runs 10 to 15 per cent of the investment, every year.

The Economic Order Quantity was derived by calculus. Its validity is best demonstrated by setting up a table for comparison of total costs at various ordering quantities, Fig. 2. It is similar to the economic lot size formula commonly used by manufacturing to determine batch quantities to be processed.

The minimum and economic order quantity are two entirely separate considerations. Availability is the predominating factor in setting minimums. Ordering versus stocking costs determine economic order quantities.

Use of the Economic Order Quantity will invariably result in lower inventory or reduced frequency of ordering; often both. The normal tendency of "seat of the pants" judgment is to over-order high priced, slow moving stock and to order inexpensive, fast moving items too often. This will result in too large an inventory and too high a stores operating cost.

The storeskeeper is in the middle of pressure from management for low inventory and pressure from the foreman for "plenty of everything." By analyzing turnover, unit prices and maximum normal usage during replacement time, optimum levels of inventory for each of the items in stock can be determined.

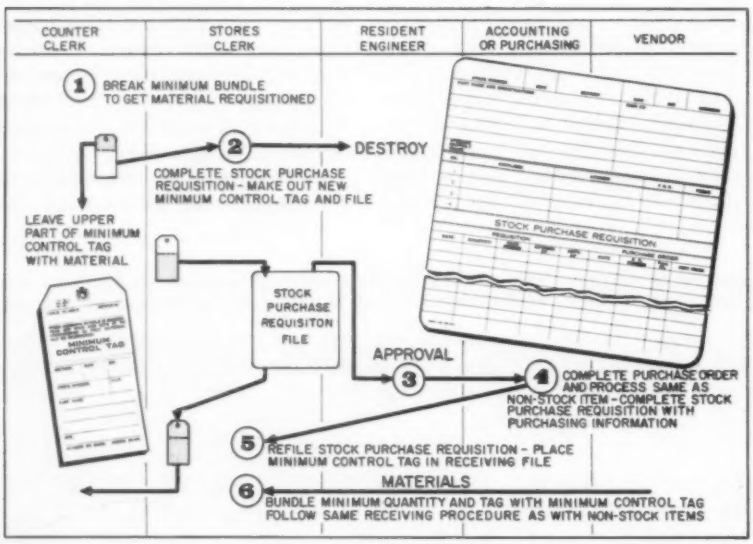
A total of optimum inventories of all stock items will then give a "par" for inventory based on facts rather than subjective opinion. A chart of monthly inventory investment versus the optimum investment can then act as a control chart on inventory and be an excellent measure of effectiveness in stores management. Disagreements can normally be restored if they are centered around particular stock items rather than gross inventory figures.

Streamline the stores procedures—Get a minimum operating cost in stores. The traveling requisition system, Fig. 3, offers many advantages:

1. Clerical time required to reorder is minimized.
2. Turnover usage is recorded in the storesroom for computation of Economic Order Quantity.
3. Complete ordering information is included right on the traveling requisition used to reorder —result: fewer mixups between stores and purchasing.
4. Purchasing has vendor information available directly from traveling requisition without reference to their files.
5. Latest price of each stock item is available directly from the storesroom.

At our plant a traveling requisition is processed according to the flow chart in Fig. 3. The file of traveling requisitions is maintained in the storesroom. Expense distribution of supplies used and dollar inventory investment is by groups of similarly priced items to minimize clerical time in accounting.

Installation of such a procedure is a long term project requiring considerable man-hours to completely establish. However, once installed, it requires little time to maintain. And most significant, it provides the realistic kind of control required to make sure the materials are supplied at a minimum cost. **End**


COUNTER CLERK
STORES CLERK
RESIDENT ENGINEER
ACCOUNTING OR PURCHASING
VENDOR
1 BREAK MINIMUM BUNDLE TO GET MATERIAL REQUISITIONED
2 DESTROY
COMPLETE STOCK PURCHASE REQUISITION - MAKE OUT NEW MINIMUM CONTROL TAG AND FILE
LEAVE UPPER PART OF MINIMUM CONTROL TAG WITH MATERIAL
STOCK PURCHASE REQUISITON FILE
APPROVAL
3
4 COMPLETE PURCHASE ORDER AND PROCESS SAME AS NON-STOCK ITEM - COMPLETE STOCK PURCHASE REQUISITION WITH PURCHASING INFORMATION
5 REFILE STOCK PURCHASE REQUISITION - PLACE MINIMUM CONTROL TAG IN RECEIVING FILE
MATERIALS
6 BUNDLE MINIMUM QUANTITY AND TAG WITH MINIMUM CONTROL TAG FOLLOW SAME RECEIVING PROCEDURE AS WITH NON-STOCK ITEMS

Flow chart indicates number of steps required to reorder stock items. Control of reordering (when minimums are broken) is positive, and is a physical in-the-bin control. Such a procedure is essential for the successful control of stores.

Sh-h-h-h! NYLON AT WORK

How It's Used To Cut Noise and Power Requirements

TOO FREQUENTLY even a plant engineer is apt to take too narrow a look at a problem and thereby discard a solution for surface reasons. That all angles should be fully considered is amply illustrated by the results of a noise control investigation conducted by Abbott Machine Co., Inc., Wilton, N. H., on their automatic traveling spindle winders.

One of the major sources of noise was the sliding contact between hardened steel traverse cams and their followers and between the followers and their guide rods. The steel cams revolve at a top speed of 4200 rpm and, with a 6 to 1 ratio, drive the follower at 700 cycles per minute. Initial attempts to quiet this operation by replacing the steel follower with nylon failed because the hardened barrel cam wore the nylon follower too rapidly.

The obvious solution — an all nylon design—seemed too costly. Preliminary cost estimates showed the nylon cams to be as much as 75 to 80 per cent more costly. This would not be too bad on a new machine, but to replace cams on existing machines could run $1500 to $3000 a machine depending on the number of spindles.

Cams were machined from 2 in., O.D. extruded-Nylon 101 bar stock. This specially processed nylon, manufactured by The Polymer Corp., Reading, Pa., is a member of the "hard" nylon group and has superior machineability. The extruded bar stock is machined with standard metalworking equipment. Faster speeds in machining and fewer finishing processes help offset the basic material cost.

The engineers had hoped for improved production to alleviate the resistance to the higher price cams. What they did not fully anticipate was the results obtained with the nylon cams. Machines equipped with the cams boosted output up to 40 per cent, cut maintenance, reduced power consumption, improved the product and opened the way to further refinements that the engineers feel make the unit cost comparable to the old design.

Production speeds on machines with nylon cams jumped from 625 yards per minute to 875 yards a minute. Two inherent factors made this tremendous increase possible—reduced cam weight and reduced noise level.

At each end of the machine, the package and the cam are lifted from one power roll and lowered onto the opposite power roll. Both the cam and package accelerate from zero to top speed after being lowered onto the power roll. The lightweight nylon cam accelerates to its top speed faster, distributing the thread more evenly to form a better package.

The 3½-pound weight differential—5-lb steel cam, 1½-lb nylon cam—markedly influences operating costs and maintenance. In the average machine of 145 spindles, the power required to accelerate and drive a quarter-ton of cams at a top speed of 4200 rpm is saved. Individually, the lighter cams place less of a load on the bearings, thereby improving bearing performance. **End**

Operator complaints about the noise level of Abbott winding machines led to an engineering investigation that replaced the steel traverse cams with cams machined from nylon bar stock. One of the cams is pictured at top of the page.

STEAM TRAP SELECTION CHART FOR CONDENSATE LOAD PROBLEMS

3. Determining Condensate Formed With Excess Heat Exchange Area

By Wm. G. STEINMILLER, Research Engineer, Yarnall-Waring Co., Chestnut Hill, Philadelphia

WHEN THE HEAT-EXCHANGE equipment has more surface than that needed to heat a specified quantity of liquid in a given time, and condensate is withdrawn as rapidly as formed (which is usually desirable), use the accompanying chart to compute the condensate load.

The chart can be used for the heating of water, chemical solutions, oils, and other liquids. The monogram was drawn for submerged steel heating surfaces but the results can be used for other materials if a factor is applied. Thus, for copper, multiply the chart result by two. For brass multiply the chart result by 1/6.

Chart may be entered at either the heat transfer rate, Btu per hr per sq ft, or the lefthand table on the chart may be used first to get the heat transfer rate at the mean temperature difference. In Table I the mean temperature difference = temperature of the steam minus the average liquid temperature, both in deg F. And the same table contains heat transfer rates, in Btu per hr per sq ft, for the corresponding Mtd's (mean temperature differences).

Example: How much condensate is formed in a steel coil when the heat transfer rate is 5000 Btu per hr per sq ft and the steam pressure is 100 psig if the heating surface has an area of 3000 sq ft? How much condensate would be formed in this coil if it were made of copper?

Solution: Enter the chart on the left at the heat transfer rate of 5000 Btu per hr per sq ft and project to the right to the steam pressure of 100 psig. From the intersection of this line with the pivot line, draw a second line to the heat transfer area of 3000 sq ft on the right. At the intersection with the condensate scale read the condensate load for a steel coil as 17,000 lb per hr. If the coil were made of copper the condensate load, using the proper factor listed above would be 17,000 × 2 = 34,000 lb per hr.

To find the mean temperature difference when using this chart the steam temperature-pressure table is extremely useful.

The heat transfer rates given in Table I are based on tests of actual steel coils under a variety of operating conditions. **End**

Tables I and II. Columns, left, show mean temperature difference and heat transfer rate. In Table II, columns at right, the saturated steam temperatures are approximate.

I		II	
Mean Temperature Difference	Heat Transfer Rate	Pressure Psig	Temperature F
10	280	0	212
20	930	10	240
30	1900	20	259
40	3100	30	274
50	4500	40	287
60	6250	50	298
70	8000	100	338
80	10,400	150	366
90	12,500	200	388
100	15,000	250	406
125	22,400	300	422
150	30,000	350	436
175	40,000	400	448
200	50,000	450	460
250	82,000	500	470
300	100,000	600	489

Nomograms in the Complete Series

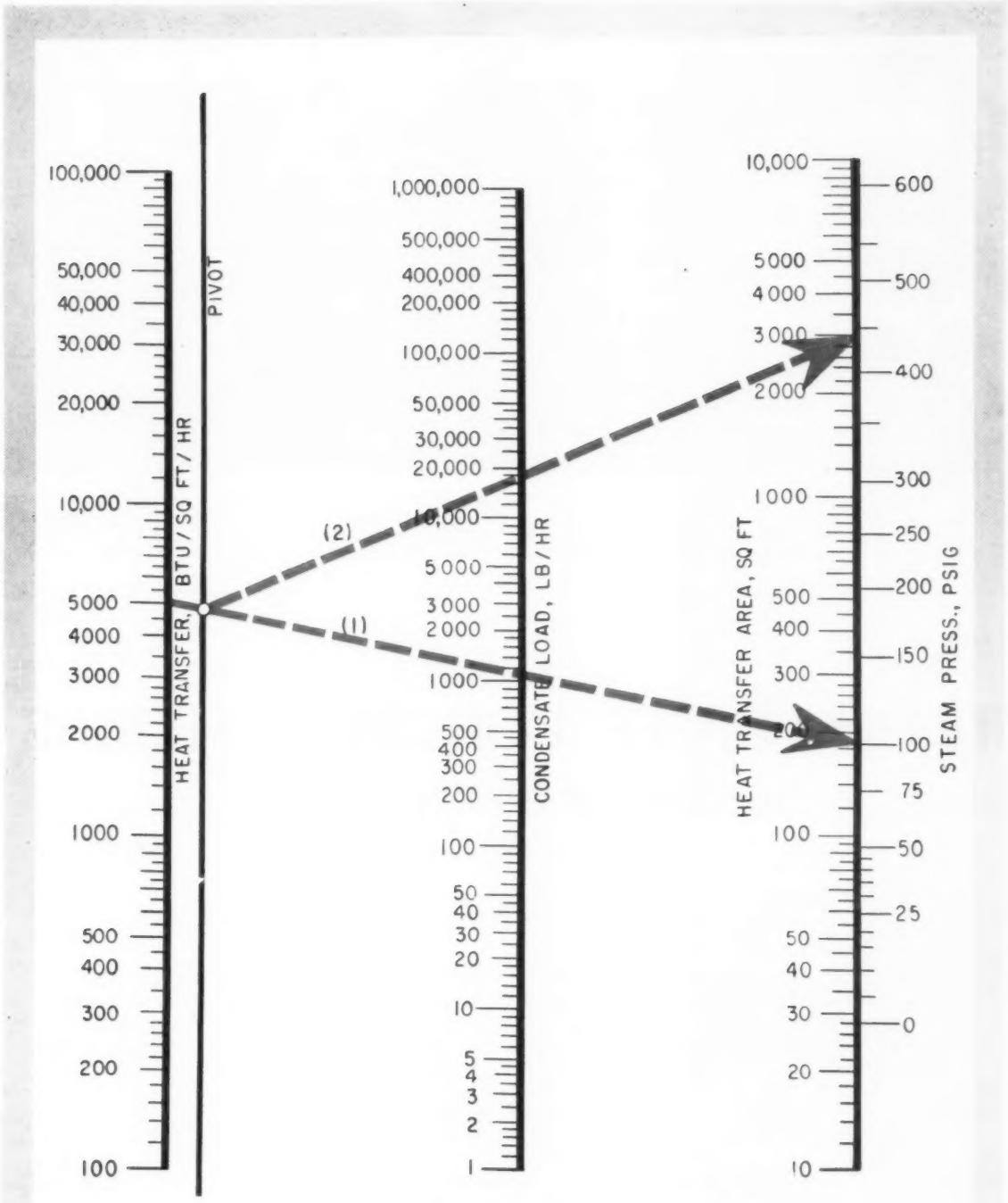
The accompanying chart is another one in the series of trap selection aids; the first of which appeared in the September issue of Plant Engineering. Other charts in the complete series are useful in determining the following:

1. Condensate formed in heating liquids and solids.
2. Condensate formed in submerged heating surfaces.
4. Condensate formed in air heating coils.
5. Condensate formed in coil-type space heaters.
6. Application of trap safety factors.

What's the Chart Based On?

This chart is based on the relation: $C = AB/L$

C = condensate load, lb per hr
A = heat transfer area, sq ft
B = heat transfer rate, Btu/hr/sq ft
L = latent heat of steam at the trap operating pressure, Btu/lb



NO. 3 - CONDENSATE LOAD WITH EXCESS HEAT EXCHANGE AREA

Fig. 1. There is more to laying a floor than merely pouring cement. Here, left to right, are a number of principal operations involved after materials have been selected and properly mixed: hand trowelling, power trowelling, power floating, scraping floor, curing, grouting, etc. In center of photo a number of steps in the absorption process are shown. This process removes a precise amount of water from the mix and is considered the heart of a good floor installation.

TROUBLE-FREE CONCRETE FLOORS

How To Get Them and Keep Them

By W. C. PERRY, Kalman Floor Company, New York

GOOD FLOOR CARE can significantly reduce manufacturing and maintenance costs. In extreme cases, a high rejection rate of completed parts may be attributed directly to a poorly laid floor.

In general, there are several economic factors to consider when buying (or repairing) a concrete floor:

1. *Cost*—This includes the cost of preparing the soil, if necessary, on which the slab will lie. In the case of repairs or major work, production losses should be considered.

2. *Durability*—This item is important because the life of a floor is a key factor in its cost.

3. *Imperviousness to Liquids*—Many liquids, such as oil and gasoline, cause concrete to decompose. Thus, a concrete which quickly absorbs whatever liquid is spilled on it will soon become weakened.

4. *Ease of Maintenance* — A rough concrete has a higher coefficient of friction than a smooth concrete. The former, therefore, is harder to sweep and the particles of dirt are harder to remove from the floor. Thus, generally, rough concrete is dirtier than smooth concrete.

5. *Fire Resistance* — This is a factor in favor of concrete, because it will not "add fuel" to a fire and it would be a factor in lower insurance costs.

No flooring surface, not even concrete, meets all service requirements. The choice of a floor must, therefore, be based on an industrial plant's prime requirements.

To all but construction engineers, it may come as a surprise to learn that all concrete is not the same. Generally speaking, there are two types of concrete floors—these are monolithic and granolithic.

The monolithic type makes good structural concrete, but the surface does not stand up well under severe wear. This is because of the method used to install the concrete and because of the materials used.

The granolithic type is a surface finish. Among the things that differentiate it, technically, from monolithic are the following: the water-cement ratio used in the mix; the method of removing the excess water (absorption process is the most effective) once the concrete has been poured; the aggregate used; the trowelling operation; and the curing operation. The granolithic type produces a surface with great density, strength, toughness, and wear resistance.

Proper installation can substantially reduce flooring problems. For example, the floor of a foodstuffs warehouse presents the special problem of cleanliness. Like other heavy-duty floors, it must withstand heavy loads and the constant pounding of large materials handling equipment. But, if it is not easy to clean, or if the surface is so soft that minute particles crumble, the amount of dust in the air increases significantly, increasing the possibility that the food itself might become contaminated by the dust.

One warehouse in which that problem has been faced and conquered is the Suffolk, Virginia, warehouse of Thomas J. Lipton, Inc., Fig. 3. Floor area consists of 123,000 sq ft. The floor was laid in 1955 and it has required no sealing, has not dusted, and it has acquired a permanent polish with use.

Poor flooring on the other hand quickly wears out and several unwanted things then occur: (1) The surface becomes unsafe for employees to work on. (2) Materials handling becomes more difficult; the possibility of damage to equipment and finished parts is increased. (3) A significant amount of dust in the air must be expected — dust which will get into your employee's lungs and into the machinery and finished products.

Each industry seems subjected to peculiarities all its own. For example, when the Union Special Machine Co., Chicago, installed a 350 F japanning oven some years ago a number of unusual flooring problems arose.

The floor under the oven was made of a monolithic concrete slab and wood. To protect the floor a steel plate was placed under the oven. But the plate buckled as steel-wheeled hand trucks were pushed onto and across it. Periodically, the oven had to be lifted, the plate removed and sheared off, and then replaced.

This, of course, was unsatisfactory and the company sought to rectify it. A mastic was tried and then an expanded metal grid in the mastic. But in each case the mastic melted under the intense heat. Next a granolithic topping was laid and it solved the problem.

Regardless of the type of flooring you choose, you will do well to thoroughly check the experience and qualifications of your contractor.

Proper maintenance procedures are essential to keeping a good floor. In general, these two steps are sufficient:

1. *Continuous Inspection* — Make each operating foreman responsible for reporting surface imperfections. No matter how small the imperfection might be it is easier and cheaper to fix it immediately. If left alone, little imperfections such as cracks or small holes quickly grow into big flooring problems which are difficult and expensive to repair.

2. *Regular Sweeping and Washing* — Such things as oils and gasolines cause concrete to decompose chemically if they are permitted to remain on floors for any length of time, Fig. 4. Likewise pieces of abrasive materials can be ground into the floors by passing vehicles and might chip the concrete.

In summary, there need be no difficulty with concrete flooring if these points are remembered: 1. Select the right type of concrete for the job. 2. Select the right contractor to do the job. 3. Protect your floor by proper maintenance procedures. **End**

Fig. 2. All granolithic, but floor under truck was laid by absorption process.

Fig. 3. This floor, laid in 1955, has required no sealing and has not dusted.

Fig. 4. Surface erosion took place because spilled liquids were not cleaned.

MONITORING OF RADIOACTIVE WASTES

Increased Use of Tracers, Plus Growing Number of Industrial Labs Makes Record Keeping Mandatory

By JOHN M. RUDDY, Chief Engineer, Architectural Div., Brookhaven National Labs.

BROOKHAVEN NATIONAL Laboratory's sanitary drainage system is essentially that which was inherited in 1946 at the Army's Camp Upton Site. It consists of a Transite and vitrified tile sewerage collection system followed by treatment in Imhoff tanks and on intermittent slow sand filters constituting the sewage disposal system. After chlorination to a substantial residual, the effluent of the sand filter flows into the headwaters of the Peconic River which discharges into the Peconic Bay at Riverhead, Long Island. In fact, the effluent is the headwaters of this river in the dry months of the year.

Substantially all water, including that used in the various laboratories, flows into the sanitary system. The only pertinent exceptions are those liquid wastes which are known or suspected of being radioactive. These known or suspected radioactive liquid wastes are held up in tanks, monitored and treated separately by compressive distillation. This concentrated "hot" slurry is disposed of in the ocean as a portland cement—slurry solid.

There are other occasional and minor quantities of contamination. These come from laboratories using tracer and low level techniques and from minor spills anywhere that the liquid waste is not held up in tanks and monitored. A very low and safe limit has been established for the total amount of radioactivity which may leave the site in the effluent of the sewage disposal system in any one year.

This means that monitoring and recording of the effluent as it leaves the site is essential. In addition, it is necessary, for legal reasons, to have a continuous record of the quantity of radioactivity in this effluent over the years. Lastly, some degree of general control of otherwise unmonitored liquid wastes must be established so that when minor peaks of activity show up at the sewage plant they can be identified and

Fig. 1. Photo of the equipment installed at Brookhaven for collecting effluent samples from sanitary system. Drawing in Fig. 3 shows details of equipment.

traced back to their causes. Then, corrective measures may be taken to eliminate or control any potentially hazardous sewerage system contamination problems.

Our sewage treatment plant was designed for many thousands of encamped soldiers and provided for very little clear water waste. The present use by about 1700 persons, mostly on a forty hour week, plus a great deal of substantially clear water from experimental areas make the sewage treatment works almost inactive biologically.

In the last few years the quantity of sanitary waste reaching the Imhoff tanks has varied from a minimum flow rate of about 150,000 gpd to about 1,000,000 gpd with an average of about 500,000 gallons per day. The high rates are on week days during working hours when it rains and the low rates are at nights and on weekends in dry weather. The sewage plant influent has an average pH of 6.8 which varies between 6.0 and 7.6.

Primary treatment is by two ordinary uncovered Imhoff tanks approximately 15 ft wide by 50 ft long. The Imhoff effluent passes through a weir manhole at a gage house to a 25,000 gal capacity dosing tank which automatically syphons on to each one of four, one-acre, natural, intermittent slow sand filters in rotation. The filtered effluent is collected by underground tile pipe drains and passes through a chlorination and weir tank at a chlorine and gage house to discharge into the dilution stream. A plan of the sewage system is shown in Fig. 2.

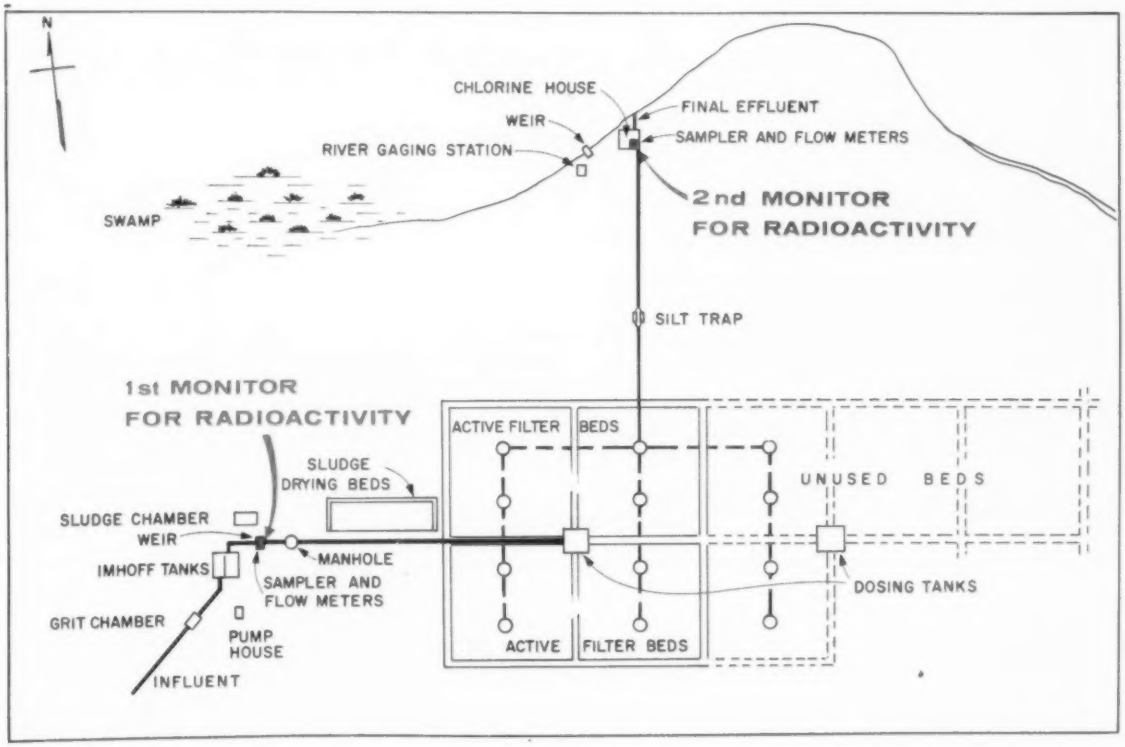
Sewage disposal plant effluent flow rate is measured and recorded in two places; first, at the gage house and weir manhole immediately following the Imhoff tanks and second, at the chlorination house and weir tank before it is discharged into the stream. The stream flow rate is also measured and recorded at two points; first, at a weir and gage house just prior to the discharge point of the sewage effluent and second, at a weir and gage house where the stream leaves the Laboratory Site.

Liquid flow measurements are made with standard 90 deg V-notch weirs of steel plate and well type flow meters. The flow meters for the sewage effluent use two Foxboro float and cable-type instruments with automatic daily recording. The flow meters for the dilution steam are two Stevens Type F, also with automatic daily recording. Because the headwater of the Peconic River is a ground water stream, i.e., the ground water table cuts the ground surface at the stream level, there is always more water leaving the boundaries of the Site than that flowing immediately past the sewage plant effluent.

Monitoring for radioactivity is accomplished at the two locations of the Foxboro sewage rate-of-flow recorders; first at the gage house immediately following the Imhoff tanks and second at the chlorination house prior to final discharge into the Peconic River. These points are indicated on the sketch, Fig. 2.

The use of these two particular locations permits the knowledge and recording of three important quantities; first the total "activity" in the liquids from the sewer-

Fig. 2. Monitoring for radioactivity in Brookhaven's sewerage system is accomplished at two locations as shown here in color. First point is immediately after the Imhoff tanks. Second point is at the chlorination house prior to discharge.



age system except that retained in the Imhoff sludge, second the total "activity" discharged into the river, and the third the difference between these two quantities which is the "activity" retained on the sand filters or leached into the ground water.

A series of field and laboratory tests several years ago showed that 90 to 98 per cent of the "activity" was retained on the filter beds and substantially all in the upper 3 in. — but only after the beds were in use awhile. These tests also indicated that it might take an indefinite time to saturate the filter beds to a point where they would no longer retain enough of the radioactivity. There is also evidence that some radioactive isotopes are held to a greater extent on the sand filters than are some others.

First part of the monitoring system is the collection of effluent samples which are taken proportionately just prior to the V-notch weirs at the gage and chlorination houses by means of two Trebler samplers, one at each point. A Trebler sampler is a slow constant speed rotating logarithmic type scoop whose shape is such that it dips up a liquid sample in exact ratio to the flow over the weir between zero and full scale flow heads. The sampler is shown in both Figs. 1 and 3.

The scoop is chain driven by a 1/50 hp, 110 volt, single phase, totally enclosed gear reduction motor. The sample flows through a hollow section of the scoop axle to a 10 in. by 10 in. by 10 in. (approximately four gallon) sample can with a long handle. The scoop sizes and speed are such that the ratio of sample to flow is 1/300,000 at the Imhoff tank effluent and 1/100,000 after the slow sand filters at the chlorination house.

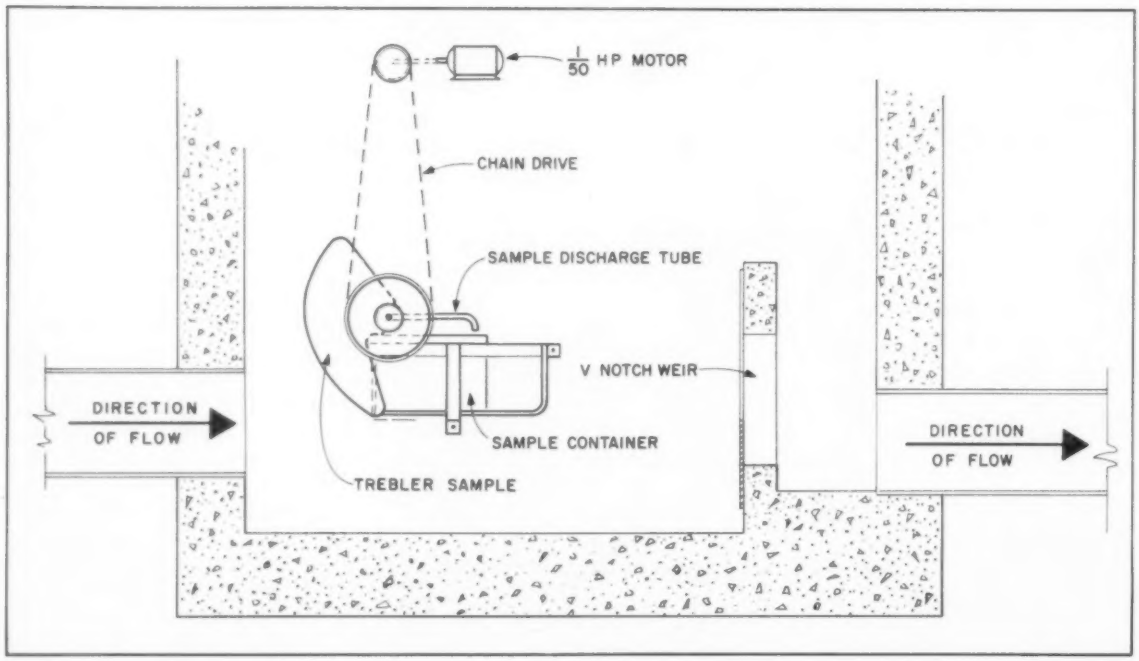
This partially automatic sampling and flow measuring system becomes a monitoring system by the daily removal and marking of the four flow rate charts and by the daily removal of the proportional samples from the two sample cans for laboratory processing. This processing consists of taking a well mixed aliquot of each of these several gallon proportional samples and carefully evaporating to dryness and "counting" to determine the quantity of radioactive material.

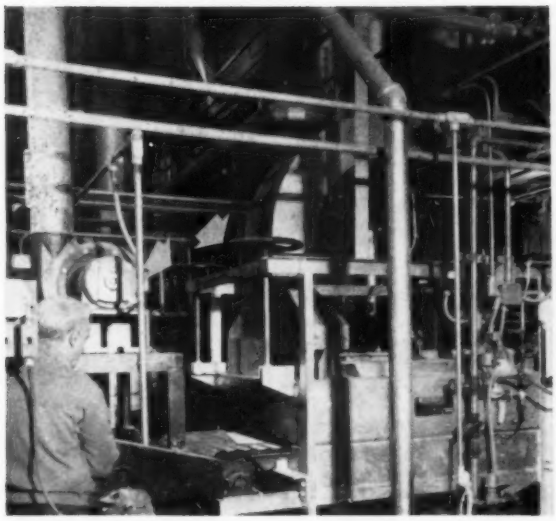
A total quantity of each sampling period is obtained by multiplication by the reduction factors. Specific radioactivity in any one sampling period can be obtained by combining this data with the flow for the period. There seems to be enough mixing action around the proportional samplers to obtain representative samples. Careful records are kept of all this data.

This radioactivity monitoring system has been in operation now about eight years.

The monitoring system as described or some variation could probably apply in other locations provided a careful evaluation of the variables were made, particularly since much of the information herein is qualitative only. Possibly consideration should be given to a more specifically corrosion-resistant scoop such as one made of Teflon. At the present time automatic and recording radioactivity meters are not developed to a degree which would permit their use with liquid wastes that have the extremely low level of "activity" of sewage effluent. Also any buildup of a small amount of radioactive material at or near the detector or probe could completely negate the readings. The only sure method of knowing the quantity of radioactivity is to carefully take proportional samples and process them precisely in a controlled laboratory environment. **End**

Fig. 3. This sketch gives construction details of effluent sampling mechanisms that are installed at two points in system.





Shingles are shown here entering the chamber of 4-ft-long heater. Handwheels, arrows, raise the roof to permit access to chamber. Pan under furnace collects belt-cooling water.

RADIANT UNITS SOLVE NO-SPACE PROBLEM FOR PRODUCT HEATING

By G. J. KRONMILLER, Project Engineer
Johns-Manville Co., Manville, N. J.

"HOW CAN WE provide rapid, uniform shingle preheating, which is required in the new type of treatment for prevention of lime efflorescence, in the limited space we have available?"

That was the disturbing question the Johns-Manville General Plant Engineering Department was faced with when we discarded the old technique of fighting "bloom"—removing it after formation with an acid wash.

The question was answered with specially-designed, custom-built, 4-ft-long conveyor-type furnaces, that are now successfully providing this necessary heat application prior to the all-important anti-bloom treatment. A preventive solution was also developed, which, when sprayed on the preheated surfaces of the shingles, eliminates any extra handling for lime removal during subsequent processing.

Limited space was not the only problem, however, that had to be and was solved with the unusual design of these radiation units. Each furnace, made by Selas Corporation of America, had to raise shingle surface temperature uniformly to the required level for proper application of the preventive, and also had to accommodate the established production rates.

It was also necessary to provide adjustable belt speed and heat input to take care of any combination of furnace temperature and belt speed. Several different styles and colors of shingles required different processing temperatures and long shingles had to be passed through the furnace faster than short ones in order that the same number would be processed in any given time, regardless of size.

Adding such intricate equipment to even one existing production line, without disrupting its established schedule, is difficult. But the design of these Gradiation furnaces was worked out to meet every one of these additional requirements.

At the Manville plant, for example, where three such installations were made, processing of shingles is now being accomplished in a series of separate operations on each of the lines. Operations have been standardized to fit in with the optimum performance rate of various mechanical steps incident to conveying, shaping, etc.

The limits for under-and-over heating of shingles are bound by such a narrow temperature range that heating just to the required temperature in a separately-installed furnace would not suffice because heat would be lost during transfer back to the line, and any extra heating to compensate for such heat loss would result in inferior shingles.

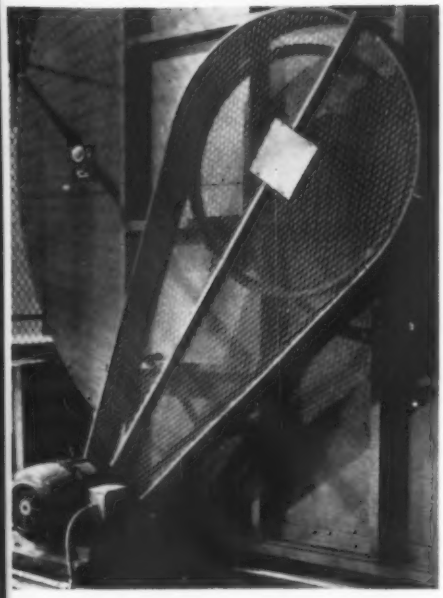
Therefore, the furnaces were inserted in the existing production line at the exact location where preheating was required.

Provisions were also made to protect the belt—that carries the shingles—from the intense, directed heat being concentrated on the shingles. A cold water sprayer, located under the furnace at the exit, cools the belt as soon as it leaves the chamber and a pan under the sprayer collects the water.

This cooling action not only benefits belt life, but the actual shingle processing itself. Since shingles passing through the furnace do not necessarily cover the same area of the belt as preceding shingles, the belt is exposed to heat unevenly. The cold water spray, however, cools all parts of the belt uniformly, attaining a belt temperature suitable for receiving shingles and eliminating the danger of high heat sections.

Additional features of the installation at the Manville plant include a timing device, an automatic temperature controller and automatic ignition with flame failure protection.

The timing device is used on the belt drive to keep the belt in motion for one-half hour after burner shutdown. It prevents overheating of the belt on that area which would be left inside the hot chamber if belt were stopped immediately. **End**



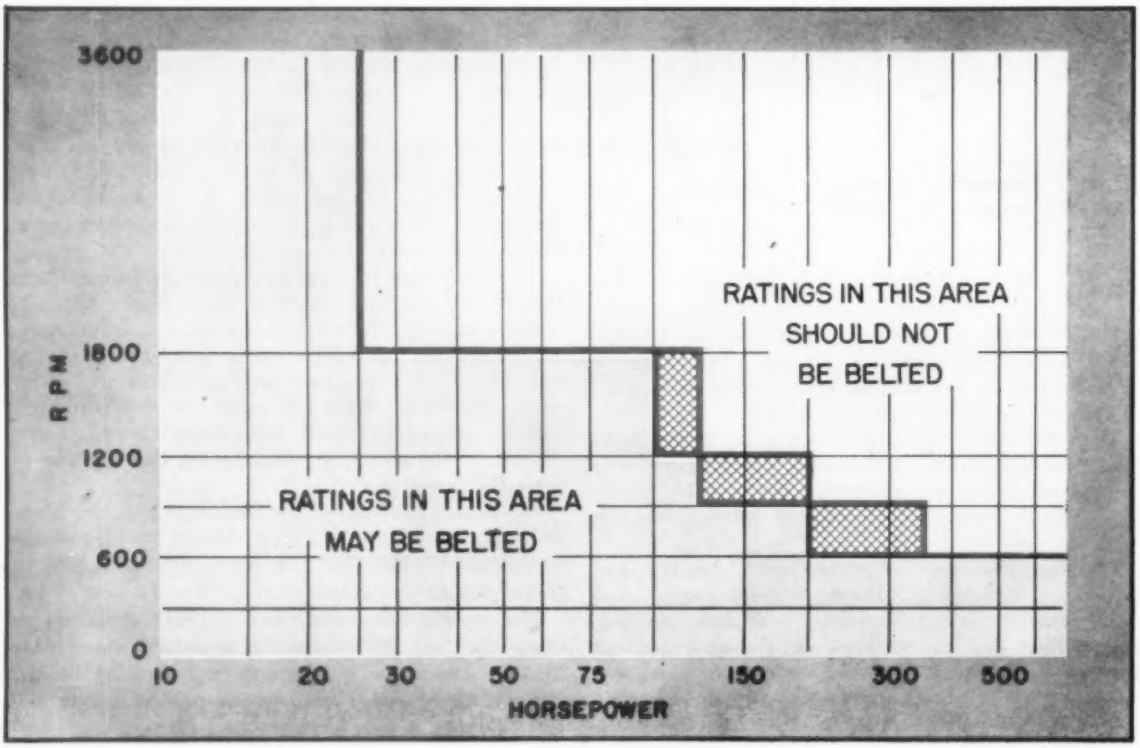
HOW TO SPECIFY AND APPLY A-C MOTORS TO V-BELT DRIVES

By R. L. NAILEN, Westinghouse Electric Corporation

THERE ARE FEW industrial operations today which do not use alternating current motors that drive loads through V-belts. Horsepowers of less than 1 to more than 1000 are commonly transmitted. This type of drive affords great advantages as an economical and readily adjustable method for a few standard motor speeds to drive machinery at a wide range of speeds.

Loads of high inertia may be driven by motors of low-starting capacity through the use of a relatively high-speed motor that is "belted down" to the lower speed load. Also, a sudden stall-

Fig. 1. Guide to motor horsepowers and speeds which ordinarily may or may not be belted. This applies to standard two-bearing, dripproof motors, 440 or 2300 v. Ratings in cross-hatched area may sometimes be belted, depending on drive design. Exceptions to this chart will depend on the motor enclosure, voltage, and manufacturer's design.



ing of the load will not necessarily damage the motor but may simply cause belt slippage. Belted motors may also be above, below, or to one side of the load.

However, the advantages can be nullified by any improperly applied or maintained component—belt, sheave, or drive motor. Although complete data on belt and sheave selection is available from handbooks published by the leading manufacturers, it is necessary in planning a drive to understand the effects of belting on the driving motor and to know how to specify motors for belted service.

Side Load Effects

Because of the fact that the belts must be under tension in order to drive the load, a side pull is imposed on the shaft of a belted motor. This condition produces effects of (a) radial load on the bearings (particularly the bearing at the sheave end of the motor) and (b) bending and shear stress in the shaft. Motors for belted application must be designed to withstand these loadings without danger of shaft breakage or undue reduction in bearing life.

For small motors, in the NEMA frame sizes 182 through 286, this poses no special problem.

However, as motors go up in frame size, the sheave width required to transmit rated motor horsepower without overstraining the belts becomes progressively greater. Therefore, beginning with the 324 frame and continuing on through the 505 frame, it is no longer practicable to have a single standard shaft extension, rugged enough to stand the belt pull.

Two standard shafts are available: the "short" or "S" shaft for direct-coupled drive, and the "long" shaft for belting. Not only length, but shaft diameter as well, is usually increased when the long shaft is used, because the increasing overhang of the sheave raise the shaft bending stress.

Greater shaft diameters as well as greater belt pull also lead to larger bearings on the sheave end of the belted motor. Table I tabulates the NEMA standard shaft extension dimensions.

Steps in Specifying a Motor for Belt Drive

1. **Determine the speed** of the driving motor that will be ordered. Experience with similar drives is the best guide for this. Space available for the motor; speed, inertia and torque requirements of the driven machine; and the limitations of Fig. 1, will usually result in only one or two practicable speeds.
2. **Once motor speed is fixed,** the physical size of the motor is tied down fairly closely. Center-to-center spacing between driving shafts can then be approximated.
3. **Selection of belts and sheaves** for the drive is the next step. Excellent handbooks for this purpose are readily available from belt manufacturers. In ordering a motor for such a drive, when the motor is to be NEMA frame size 324 or larger, be sure to specify on the order that the motor is to be belted.
4. **If motor horsepower** and speed is such that it may be a "borderline case" as shown in Fig. 1, give the complete details of the proposed drive to the motor manufacturer and he can then advise whether or not he can furnish a motor for that service. If he cannot, it may be possible to increase sheave diameter (thus reducing belt pull) or go to three bearing construction. Don't forget to let him know the direction of the belt pull! Larger motors which must be designed especially to suit the particular drive, should be negotiated in the same way.

When ordering a motor for belt drive it is always important to specify the belted frame size designation (as indicated in Table I.) whenever the motor is expected to be a size from 324 through 505. If there is any doubt as to how it should be specified, the order should state that "long shaft for belted service" is to be furnished.

It is equally important to recognize that even with the "long shaft" parts it may not be possible to belt motors of the higher speeds—3600, 1800, and even 1200 rpm, above a certain horsepower. For one thing, belt manufacturers recommend that belt speeds not exceed 5000 to 6000 fpm. Therefore, the higher the motor speed, the smaller must be the sheave

Table I. Shaft extension dimensions (V) for standard dripproof horizontal motors. Note the differences between "long" and "short" shafts in larger frame sizes.

Motor	NEMA Frame Size	Diam, in. (U)	Usable length, in. (V)
Standard May be coupled or belted	182, 184	7/8	2 1/8
	213, 215	1 1/8	2 7/8
	254-U, 256-U	1 3/8	3 5/8
	284-U, 286-U	1 5/8	4 3/4
Coupled Short shaft	324-S, 326-S	1 5/8	3 1/8
	364-US, 365-US	1 7/8	3 1/2
	404-US, 405-US	2 1/8	4
	444-US, 445-US	2 1/8	4
	504-S, 505-S	2 1/8	4 1/8
Belted Long shaft	324-U, 326-U	1 7/8	5 1/2
	364-U, 365-U	2 1/8	6 1/8
	404-U, 405-U	2 3/8	6 7/8
	444-U, 445-U	2 7/8	8 3/8
	504-U, 505	2 7/8	8 1/2

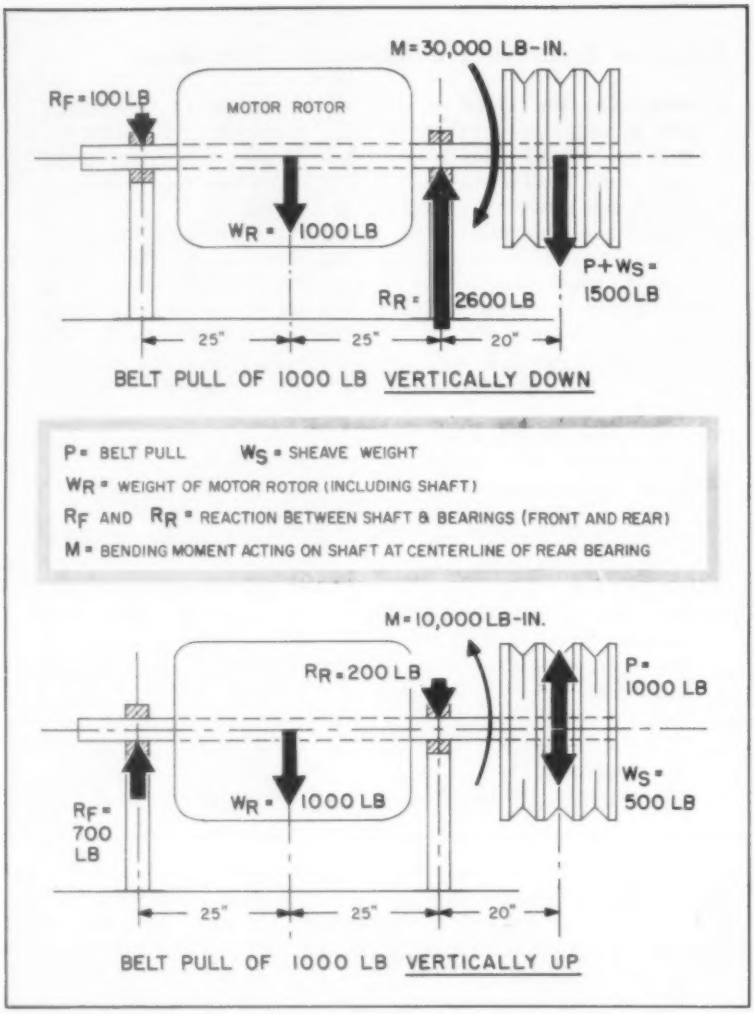
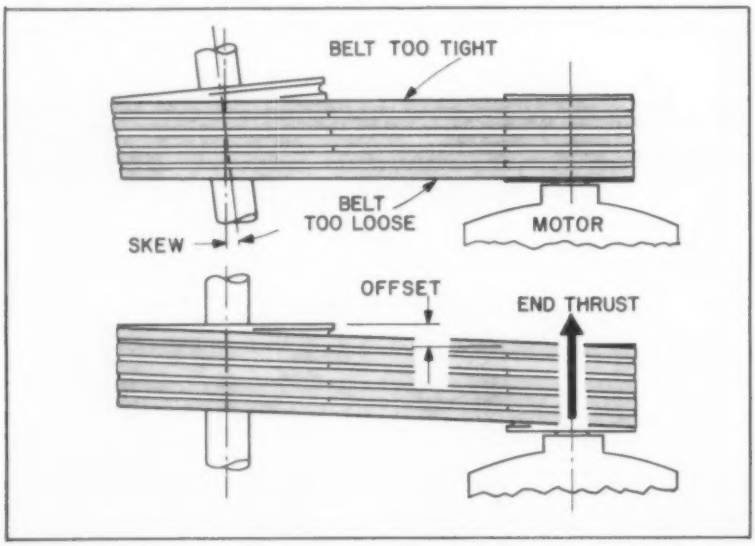

M = 30,000 LB-IN.
RF = 100 LB
MOTOR ROTOR
WR = 1000 LB
RR = 2600 LB
P+WS = 1500 LB
25"
25"
20"
BELT PULL OF 1000 LB VERTICALLY DOWN
P = BELT PULL
WS = SHEAVE WEIGHT
WR = WEIGHT OF MOTOR ROTOR (INCLUDING SHAFT)
RF AND RR = REACTION BETWEEN SHAFT & BEARINGS (FRONT AND REAR)
M = BENDING MOMENT ACTING ON SHAFT AT CENTERLINE OF REAR BEARING
M = 10,000 LB-IN.
RR = 200 LB
P = 1000 LB
WS = 500 LB
WR = 1000 LB
RF = 700 LB
25"
25"
20"
BELT PULL OF 1000 LB VERTICALLY UP

Fig. 2. Sketch shows effect of belt pull direction on motor shaft and bearing loads.

Fig. 3. Diagram shows that misalignment of sheaves can cause troubles.



pitch diameter. This in turn requires smaller belt sections, to reduce the strain on the belt caused by its flexing as it wraps around the sheave.

These smaller belts transmit less horsepower per belt. Attempting to transmit too much horsepower through the drive may then require so many belts, on so wide a sheave, that it is not practicable to provide standard motor parts which will stand the over-hung load. Furthermore, it is difficult to insure that all the belts in a large group will be under the same tension.

In addition, allowable motor bearing load (particularly on ball or roller bearings) decreases as speed goes up. Motors of 3600 rpm are especially critical; above about 60 hp, these must use smaller bearings than do slower speed designs since internal bearing surface speeds must be kept down for long life. At high speeds, these smaller bearings not only will stand less side-pull load, but also limit the size of the shaft which must pass through the bearings.

The chart in Fig. 1 indicates the range of speed and horsepower which can safely be handled by standard motors designed for belted service. In any application which is close to "borderline" on this chart, the motor manufacturer should be consulted.

It is worth noting here that it is often possible to bring a doubtful drive within safe operating conditions by relatively minor changes. Increasing sheave diameter will reduce belt pull in direct proportion. Or a decrease in the number of belts may be possible, going to a larger belt section if necessary. This may reduce the overhang of the sheave and reduce shaft stresses.

For still larger motors (75 hp and up at 900 rpm; 100 hp and up at 1200 rpm), NEMA standards no longer apply to shaft dimensions. However, each manufacturer has his own "lineup" of standard frame sizes and shaft extensions; each large belted motor must be "designed to order."

When ordering such a machine, it is therefore necessary not only to state that it is for belt drive, but also important to give the de-

tails of the drive insofar as possible. These will include:

1. Belt section (A, B, C, D, or E)
2. Number of belts
3. Sheave dimensions (pitch diameter—also face width and weight if known)
4. Direction of belt pull (whether vertically up, down, or at some in-between angle)

This information will be needed by the motor manufacturer.

The effect of pull direction on bearing loading and on shaft bending is shown in Fig. 2.

Regarding bearings themselves, sleeve bearings are not specified for belted motors as frequently as are ball or roller bearings. In the first place, a sleeve bearing will not stand as great a radial load as will an antifriction bearing of comparable size. It is almost impossible to assure that the radial load caused by belt pull will be distributed equally over the entire load-carrying surface of a sleeve bearing. Misalignment between bearing and shaft causes concentration of load on small areas of the bearing and leads to rapid wear, early failure, Fig. 4.

Of course, some degree of misalignment is always present due to shaft deflection under load. Although the effects of minor misalignment can be overcome by the use of a spherical seat bearing, at the sheave end of the motor, Fig. 4 (c), this represents no cure-all since alternating stress in the deflecting shaft may cause shaft failure.

With antifriction bearings, shaft deflection is not so much of a problem to the bearing since the inner bearing race is a press fit on the shaft. However, it should be noted that the antifriction bearing does need to be kept clean and that its service life, though long, is not indefinite. In applications where the motor is in an extremely dusty location and is so inaccessible that maintenance is difficult, sleeve bearings may at times be more desirable.

Even with the largest capacity bearings that can be used on a given motor frame size, the drive requirements sometimes result in loading so heavy that the motor bearings alone cannot carry it. Then the so-called "three bearing construction" is called for. Then, the shaft is extended through the sheave and ends in a third bearing located in an outboard pedestal. Alignment of all three bearings is assured by mounting the motor and pedestal on a common bedplate.

In still more extreme applications, special "four bearing construction" may be used, in which a conventional motor is direct-coupled to a jackshaft supported on its own two bearings. The driving sheave is mounted on the jackshaft and the motor is thus relieved of all belt pull.

Such construction is more costly than the standard "two bearing" design (for the three-bearing design, list price is increased by 25 to 30 per cent) and requires a good deal more space for the motor installation.

The most common cause of trouble with a properly designed belt drive is excessive belt tension. This is sometimes due to misalignment between driving and driven sheaves. Such misalignment can occur in two ways, as shown in Fig. 3. Not only do belts wear as a result, but sheaves may work loose on shafts, bearings fail, and shafts break. Trouble of this sort is expensive and may be dangerous to personnel.

It can be avoided by using care in installing the motor, since excessive tension can be produced when belts are first installed. Belt load consists not only of the pull needed to transmit the required horsepower, but also the "initial tension." This initial tension is, of course, determined at the time the drive is installed.

Checking at regular intervals is advisable to see that the belts are properly tightened and share the load equally. In this connection, it is advisable to purchase belts for drives in matched sets to ensure load sharing. **End**

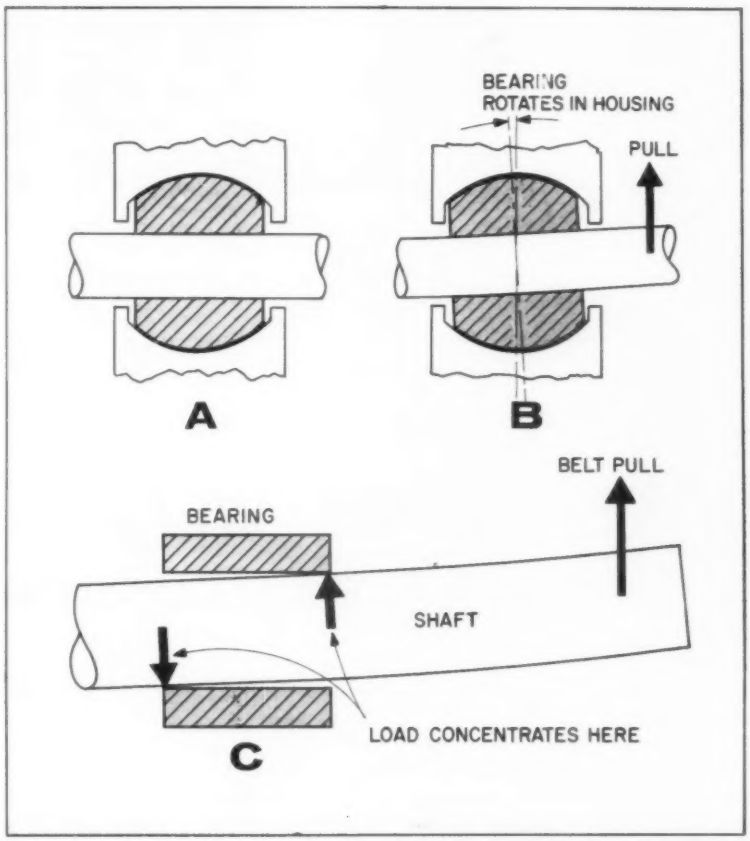


Fig. 4. Spherical seat sleeve bearing (a) and (b) adjusts to minor shaft misalignment by rotating in housing. Bearing would theoretically stand several degrees of shaft bending, but this leads to shaft stress, vibration, etc. Overloading of motor sleeve bearing (c) is due to shaft deflection under belt load.

IS THIS HAPPENING INSIDE YOUR PUMPS?

Use of these photographs will assist you in correct identification of the cause of internal pump damage. Check the entire pump — not just the parts subject to major wear or damage.

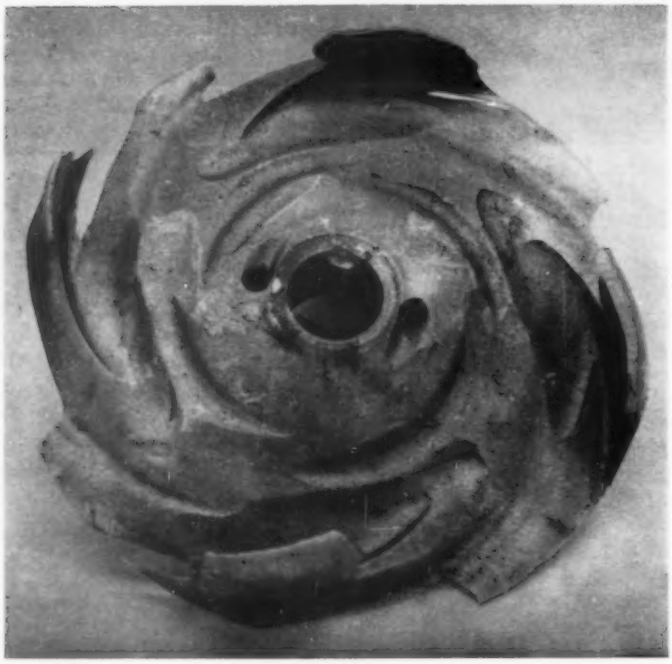


Figure 1. This impeller, made of acid-resistant bronze, is from a pump handling water containing steel mill scale. Damage is caused by erosion *only*. The impeller vanes are almost completely destroyed; however, tapped holes for the impeller puller are still in good condition, indicating that this damage is not caused by corrosion. Fabricating this impeller from an alloy more resistant to abrasion, such as hardened iron, would extend its life.

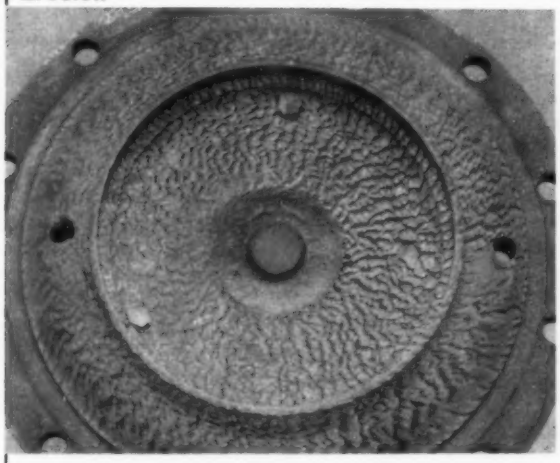
WHEN PUMPS WEAR—
Is It Erosion, Corrosion, or Both?

By P. T. LAHR, G. L. DAWSON, JR., and E. SCHWANDT, Application Division, Goulds Pumps, Inc.

CENTRIFUGAL PUMPS are being called on to handle materials more highly corrosive or abrasive than those handled in the past. Inevitably, these service demands result in internal pump damage—which may be due to corrosion, erosion, or a combination of both. Corrective measures depend on proper identification of the causes of the damage, and frequently damage is misinterpreted through failure to analyze all of the factors.

To make a correct diagnosis, it is necessary to consider the velocity distribution within a pump. Normally, the lowest velocity would be at the suction inlet, which would be the same as the velocity in the suction pipe, if pipe and suction nozzle are

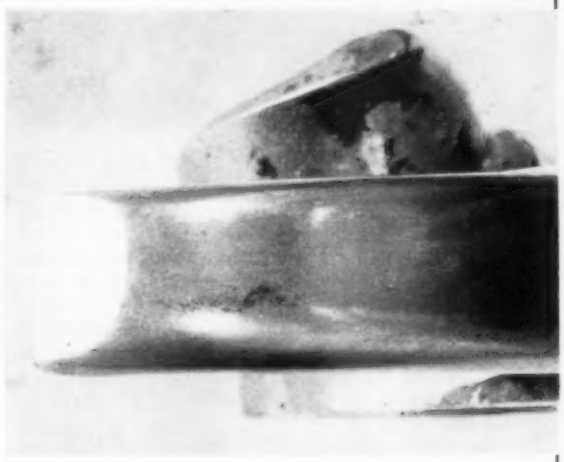
Erosion



Figures 2 and 3. This pump was employed by a salt processor to handle a high density brine solution with salt crystals in suspension. Impeller and cover are aluminum bronze. On the cover the scrubbed condition is most pronounced in areas of high velocity with an absence of scrubbing in low-velocity areas —a clue that corrosion is not the problem. Note the increased scrubbing, particularly at the wearing ring (leakage joint) where high velocity occurs. The impeller shows scrubbing in areas of high velocity but no attack on the hub. Increased metal loss at impeller tips and shroud, as compared to the balance of the impeller and casing cover, was probably due to overrating, and resultant internal circulation due to excess throttling.

From this analysis, it may be concluded that the metal is sufficiently corrosion-resistant and resists velocity and impingement, except where loss is accelerated by internal recirculation. Increased life could be expected by trimming the impeller or installing a bypass line to allow part of the flow to return to the source of supply. Under conditions of extreme abrasion, it is highly important that a pump be closely sized for the required rating. This "engineered selection" will minimize throttling and result in marked improvement in pump life.

Erosion



Figures 4 and 5. This impeller, from a pump which handled 20 per cent natural fiber and sand in water, is of 316 stainless steel (ACI CF8M). High polish on entire surface of the impeller results from the highly abrasive solids handled. Damage is the result of erosion, with no indication of corrosion. Excessive rounding of vane tips is due to excess impeller diameter. This part shows excellent abrasion resistance of austenitic metals, such as 316 stainless, which are extremely tough and, in many cases of pure abrasion, increase in resistance due to work hardening.

The rounded impeller vane tips illustrate the accelerated metal loss expected when an oversized pump is selected for an abrasive liquid. This can be corrected by reducing the impeller diameter or selecting a smaller pump whose design point is closer to the desired rating.

Is this happening inside your pumps?

the same size. The liquid is accelerated into the eye of the impeller and is discharged from the vane tips at a much higher velocity. In the casing (or volute) of the pump, velocity is converted back into pressure, and the liquid gradually decelerated from the cutwater to the discharge connection.

In addition, localized turbulence and high velocity will occur at the leakage joint (through the wearing ring), at the cutwater in the casing and at the casing drain and vent connections. Thus, consideration of velocity distribution would indicate that, in certain internal pump areas, damage would be more severe than in others. For example, if we were to pump sand in an iron- or bronze-fitted pump, we would expect a small amount of metal removal in the suction piece, a greatly increased amount throughout the impeller and the casing and a gradually decreasing amount of metal removal in the discharge nozzle. The vane tips of the impeller, the leakage joint and the cutwater would definitely suffer the most severe attack.

Corrective measures depend not only on the correct identification of the type of damage but also on the determination of the reason for the damage. Corrosive attack can be independent of velocity; that is, if the metal is not sufficiently corrosion-resistant, the attack may be quite uniform and independent of the velocity pattern. Therefore, low-velocity sections should be checked carefully to make certain there has been no corrosive attack of any type on the metal in this area.

The series of photographs reproduced here may be used as a guide to simplify correct identification of frequently misinterpreted causes of internal pump damage. In no case illustrated was there any indication that the metals were defective. **End**

Corrosion

Figure 6. Pump cover of high nickel chrome (ACI CN-7MCU) was taken from a pump handling hypochlorite bleach. The damage is typical of the pitting type attack associated with austenitic stainless steel in contact with halogen ions. Pitting results from free chlorine, with rather large and deep pits quite uniformly spread. There is no evidence of difference in attack due to differences in velocity. Hypochlorite is a common bleach liquor for paper mills and other industries and is frequently made by chlorinating a caustic, using either sodium or calcium hydroxide as the base.

If the chlorination is not properly controlled, overchlorination results, bringing about acidity of the bleach liquor and the presence of hydrochloric acid and free chlorine, which caused the pitting shown in Fig. 7. A wide variety of materials have been used with varying success, depending upon the control of the amount of chlorine added, as well as the temperature of the caustic. In a number of installations where metals were unsatisfactory, a glass-lined pump has been used successfully and economically for this difficult service.

Erosion & Corrosion

Figure 7. Cast iron suction cover from a tertiary centri-cleaner which is handling water, dilute paper stock and dirt, at pH 3.5. Damage is greatest at high-velocity areas and is caused by erosion. A superficial examination could easily lead to the incorrect diagnosis of pure abrasion; however, the gouges in the center made with a knife indicate that the cast iron was not sufficiently corrosive-resistant. This is a striking example of graphitization—a classic type of corrosion frequently associated with gray cast iron. The iron is selectively removed by the corrosive liquid, leaving a soft, weak surface of carbon and corrosive product. This softened surface is highly susceptible to erosion in areas of high velocity or impingement, yet it possesses a high degree of corrosion resistance.

This can be a problem when high velocity parts such as impeller and wear rings are replaced. The new parts will be shiny new metal and will corrode very rapidly when placed in contact with the old graphitized parts. The only solution is to up-grade the replacement parts with a material of higher corrosion resistance, such as an acid-resistant bronze.

Machine Tool With a "Seeing Eye"

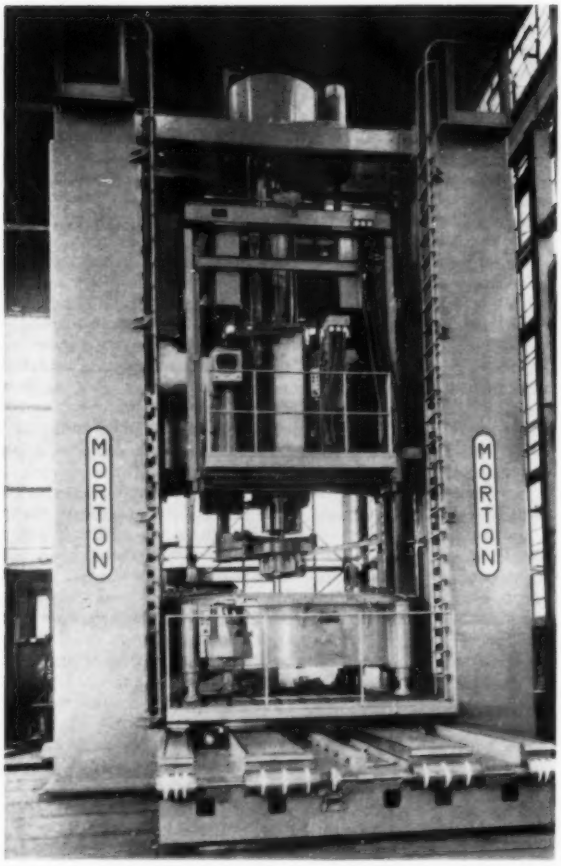


Fig. 1. TV monitor is located on height-adjustable platform.

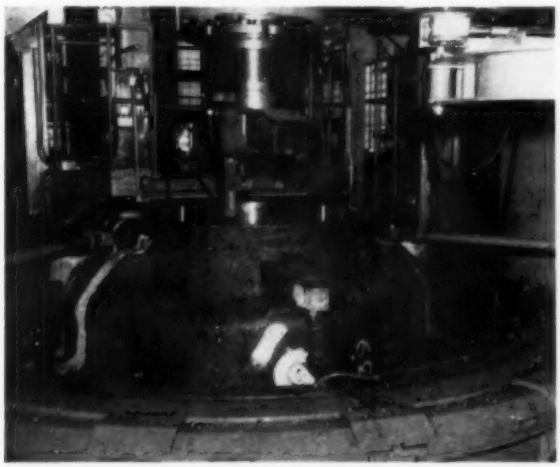


Fig. 2. High pressure turbine casing in place for machining.

RECENTLY, A GIANT machine tool equipped with its own "seeing eye" was unveiled in Muskegon Heights, Michigan, by the Morton Manufacturing Company, its builder. The machine's purpose in life is to bore and turn high pressure steam turbine casings.

Design provisions permit the machine to handle turning jobs with maximum dimensions reaching 84 in. diametrically and 48 in. lengthwise; maximum boring jobs can have 60-in. diameters and can extend to 96 in. With the cutters advancing inside the workpiece, it is advantageous to see what is going on behind the scene. This can be done by means of the TV system.

The TV camera is fastened to the double-edged tool head and rotates with it as both tools take their cuts. See Fig. 3. The tool head has a multi-prong receptacle for connecting the camera. From this receptacle the television cable extends through the spindle to slip rings located at the top of it. The cable continues, of course, to the monitor which is mounted on a pedestal located on the vertically adjustable operator's platform. See Fig. 1.

Also mounted on the control platform is a visual indicator which contains a cross section drawing of the turbine casing wall. A Selsyn system of this visual indicator makes it possible to check quickly where the cutters are operating along the inside wall of the casing. Tool position is duplicated on the cross section which can be illuminated from behind for ease of observation.

For changing tool heads, the machine has a pivoted arm which not only can be moved radially but also vertically. To facilitate the job of tool head changing there is a small elevator for transporting the operator to working height. Also incorporated in the machine package is a numerical control system for prepositioning tools. **End**

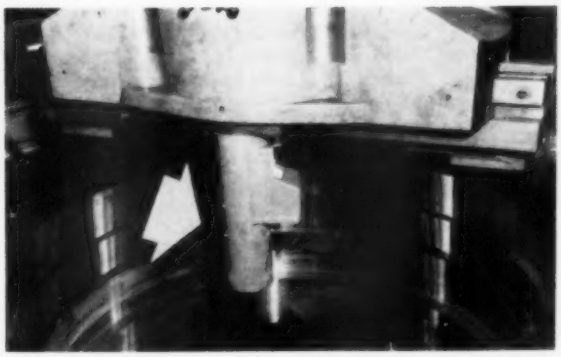


Fig. 3. TV camera shown in a working position on tool head.

CONSTRUCTION SPECIFICATIONS
IV. Analyzing Bids, Signing the Contract

By R. E. WALLIN, Chief Engineer, Construction, Plant Engineering Dept., Joseph T. Ryerson & Son, Inc.

OUR PREVIOUS ARTICLES have outlined plans and specifications and the taking of construction bids for our hypothetical construction project. In this article we will review procedures which can be followed from the receipt of bids to the signing of the construction contract.

Bids on the project, submitted in our special "Form of Proposal" discussed in the last article, are now in hand. In fairness to all concerned, the bids should be kept confidential from the time of their receipt until a thorough analysis can be completed. The supervising architect or engineer who made the plans, or someone designated by him, should be invited to join in analyzing the bids. Others concerned should also be invited if it is a joint activity.

Each bid and any accompanying letter submitted by the respective contractors is read carefully. While this is being done, a check should be made to determine that each fill-in item has been completed as requested. Items which should be highlighted for future analysis should be underlined, and marginal notes can be made of all items that should be remembered. By so doing you can obtain a rough mental picture of each bid.

The next step is to tabulate all bids, Table I. This can be done in any sequence, but it is logical to do so from the low to the high on the basis of the lump price. For this tabulation use seven or fourteen column accounting work sheet paper. List the contractors' names along the left, each with three or four blank spaces between. Head alternate columns to the right with the alternate, substitution, and unit breakdown by trades prices, extra work percentages, subcontractors' names for parts of work, bulletin numbers included in the bid, and any other pertinent subject headings requested on the form of proposal or given in a supporting letter. Any clarifying notes or comments can be entered briefly below the respective entries.

When completed, this simple tabulation gives you a very complete picture of all bids, individually as well as collectively. Inspection and analysis of the summary gives you the basic information on each bid. By reviewing each entry and calling the contractors for more information where an entry is blank, puts all contractors on the same basis for comparison.

To illustrate, let us assume that the low bidder is very low, the high bidder is very high, those in between are within a five per cent variation between low and high. As the bidders were selected on the basis of their apparent ability to do the job, reputation, and integrity, it may be assumed that the low one omitted something and that the high bidder made some other type of error, such as misplacing a decimal point. A phone call advising that something seems wrong and giving 24 hours to check their estimate not only impresses the contractor with your fairness, but it promotes his friendship.

Accepting a very low bid may be tempting, but the financial difficulties that could arise for the contractor is of no satisfaction to anyone. To avoid financial loss, an effort would probably be made by the contractor to make up the loss in poor workmanship, inexpensive and inferior materials, or other economies. These attempts to make up for a bid that is too low cause the owner endless quarrels and headaches in trying to get a job properly done.

Extra work percentages will usually indicate that one contractor's overhead and profit is higher than others, and frequently accounts for his bid being higher than some of his competition.

All the data requested in a bid is not always furnished. Your tabulation will point this out, and the answers should be secured to complete the record of each bidder. After it has been fully checked and analyzed and you are certain that all contractors have made their bids on the same basis, the job is ready to be let.

Table I. Typical bid summary taken from a recent actual construction project. Form highlights missing information

	BID SUMMARY							
Contractor	Base bid	Omit foil vapor barrier (deduct)	Substitute black top paving for concrete (deduct)	Substitute marble chips for roofers gravel (add)	Construct friction saw foundation (add)	Set concrete reinf. bars per lb	Lay concrete reinf. mesh sq. ft	Hand excavate earth rate cu. yard
A. Const. Co.	$159,400	$2,600	$8,300	$1,300	$2,000	$0.06	$0.04	
B. and Co.	167,982	2,597	5,700	0	3,750	.05	.04	
C. Inc.	Dropped Out							
D. and Assoc.	164,830	2,597	8,825	0	2,185	.038	.021	$ 6.00
E. and Sons	145,290	2,100	4,100	3,000	2,560	.045	.03	12.00
F. Const. Co.	146,900	2,300	4,800	1,000	2,700	.04	.04	12.00

If the job is simple and obvious, the plans and specifications are clear and concise, and there is comparatively little variation in the bids after all bidders have been placed on the same basis, the low bidder should be given the job.

When the job is quite complicated and involves a lot of guesswork, the plans and specifications are short and incomplete, and the bids vary quite a bit, then further checking and analysis is indicated.

A good way to analyze the bids further is to have a meeting with the architect, engineer, and any others concerned and review the plans and specifications to find areas where contractors' estimators may have erred. These points should be briefly listed, as well as noted on the plans and in the specifications.

A list should be made of matters which require oral discussion with the respective bidders. When this is completed, the lowest two or three bidders should be individually invited in to fully discuss each point on the list or on the plans or specifications. Other questions may develop during discussions, and contractors may request permission to check subcontractors for clarifications. Take the necessary time to clarify all points. When you are finally satisfied that the finished job will be what is desired, the lowest bidder should be given the job.

If the cost seems high for the work involved and the low bidder, firmly believing that his price is on the safe side, is anxious to get the work and states he might save some money on a time and material basis, you might negotiate a time and material contract with him, rather than a lump sum contract. Understand, however, that this means daily timekeeping, which may increase your own labor cost.

A verbal award should be followed by a "letter of intent" Fig. 9. This letter gives the contractor something in writing to enable him to enter into contracts with subcontractors and to place orders with suppliers.

This letter should include the date of bid, prices, numbers of covering drawings with issue dates and latest revision dates, date of specifications, numbers and dates of bulletins changing plans and specifications, the name of the project and its address, any understandings agreed to prior to verbal letting, and a statement that a formal contract will be drawn up in the near future.

The next order of business is to have a formal agreement written by the company legal department or by outside counsel after consultation with you so that the final agreement fully covers the project. The American Institute of Architects, with headquarters in Washington, D.C., has a printed "Form of Agreement between Contractor and Owner" which can be secured through your architect and needs only to be filled in to complete it.

Our experience, however, indicates that seldom does a prepared form cover all the conditions of a particular job and that, often, it covers conditions which do not apply to the job in question. As a guide, the following covenants should be included in an agreement. Anything covered in the specifications or shown on the plans need not be repeated in the agreement, unless it be for emphasis, because these documents are made a part of the agreement by specific reference.

Fig. 9. Letter of intent tells contractor you have accepted his bid and gives authorization to order materials. This form protects both parties until the formal contract is signed.

A. Contractor, Inc.
1 Main Street
Somewhere, Illinois

Gentlemen:

Pending preparation of a formal contract, this letter shall constitute our written acceptance of your proposal dated _____, 19___, wherein for the sum of $_____ you propose to furnish labor, materials, supplies, equipment, and services required, and to complete all construction in accordance with drawings numbers _____, sheets _____, dated _____, 19___, and revised to the date _____, 19___, and in accordance with specifications dated _____, 19___, pages _____ to _____, and revision bulletins _____ to _____, in connection with the construction of a two-story office building and mill type building at First Avenue and First Street, Somewhere, Illinois; subject further to the following understandings agreed to on Tuesday, _____, 19___, when you were verbally advised that the job was yours.

(List here, in numbered or lettered subparagraphs, each items of verbal understanding.)

A formal contract will be prepared by us and forwarded to you for your review and signature as soon as possible.

Very truly yours,

(Name of Owner)

Plant Engineer

The commencement of the agreement should cover the name of the city and state, the date of the agreement, the names of the owner and the contractor, along with whether or not they are corporations, partnerships, individuals, etc., their addresses, and their identification, such as "owner," or "contractor," which are the names by which they will be referred to throughout the document.

In the "whereas" clauses of the commencement, it should be pointed out what the owner intends to build, along with the address of the job and what the contractor proposes to furnish in connection with such construction.

Following the commencement, you then list articles covering the specific covenants of your agreement, and it should be concluded with the testimonium and witness or

and makes comparison of all contractors bids, alternates and unit prices possible. Only the names have been changed.

UNIT PRICES

Hand excavate rock rate cu. yard	Machine excavate rate on site cu. yard	Machine excavate trenching rate cu. yard	Concrete form work rate sq. ft	Ready-mix concrete in place rate cu. yard	Floor paving 8-inch reinforced concrete sq. ft	Blackfill and compact dirt cu. yard	Contractors insurance and taxes per cent	Contractors profit and overhead per cent	Sub-contractors profit and overhead per cent
	$2.00	$2.00	$0.90	$23.00	$0.80	$3.00	12	15	7½
	5.00		.50	35.00	.78	5.00	10	21	10
			.50	20.00	.77			7	7
$30.00	1.50	4.50	1.00	30.00	.90	4.00	12	20	10
40.00	6.00	6.00	1.00	23.00	.75	4.50	11	21	15½

Fig. 10. Time and material contracts involve many different costs. You should list all the costs that you agree to pay.

The Owner agrees to reimburse the Contractor in current funds all costs necessarily incurred for the proper prosecution of the work and paid directly by the Contractor, such costs to include the following items and shall not be at rates higher than the standard paid in the locality of the work except with prior consent of the Owner:

a) All trades labor directly on the Contractor's payroll.

b) Salaries of the Contractor's employees stationed at the field office, when approved by the Owner's representative. Contractor shall submit to the Owner's representative a salary schedule of all persons to be employed in the field office and obtain his approval before such salary or compensation is chargeable to the cost of the work.

c) The proportion of transportation, traveling, and hotel expenses of the Contractor, or of its officers or employees, incurred in discharge of duties connected with the work when such expenses have been authorized and approved by the Owner's representative.

d) Permit fees, royalties, deposits lost for causes other than the Contractor's negligence, and damages for infringement of patents, and costs of defending suits therefor, all as approved by the Owner.

e) Losses and expenses not compensated by insurance or otherwise, provided they have resulted from causes other than the fault or neglect of the Contractor. Such losses shall include settlements made with written consent and approval of the Owner. No such losses and expenses shall be included in the cost of the work for the purposes of determining the Contractor's overhead and profit fee, but if after a loss from earthquake, fire, flood, or similar cause not due to the fault or neglect of the Contractor it be put in charge of reconstruction, it shall be paid for its services on time and material basis and percentages, as outlined herein.

f) Minor expenses, such as telegrams, telephone service, expressage, and similar petty cash items.

g) Cost of hand tools, canvas, tarpaulins, etc., specifically purchased for and used in the prosecution of the work when consumed in the prosecution of the work; depreciation on such tools, canvas, tarpaulins, etc., costing Twenty-Five Dollars ($25.00) or more each, used but not consumed; and no cost or expense on such tools, canvas, tarpaulins, etc., costing less than Twenty-Five Dollars ($25.00) each, used but not consumed.

h) Materials, supplies, equipment, and transportation required for the proper execution of the work, which shall include all temporary structures and their maintenance.

i) The amounts of all subcontracts.

j) Premiums on all bonds and insurance policies required hereunder and approved by the Owner.

k) Rentals of all construction equipment, whether rented from the Contractor or others, in accordance with rental agreements, approved by the Owner's representative. Transportation of said construction equipment, costs of loading and unloading and costs of installation, dismantling and removal thereof, all in accordance with the terms of the said rental agreement.

l) Payments made by the Contractor under the Federal Insurance Contribution Act, Federal Unemployment Tax Act, or local unemployment compensation laws and union welfare contracts.

Fig. 11. Equally important, in time and material contracts, is a list of contractors costs that will not be paid by the owner.

Reimbursement of expenses to the Contractor shall not include any of the following:

a) Salary of the Contractor if an individual, or salary of any member of the Contractor if a firm, or salary of any officer of the Contractor if a corporation.

b) The salary of any person employed in the purchasing of materials, payment of salaries and wages, advertising for and awarding separate contracts or subcontracts, general administration of the business, whether employed at the main office of the Contractor or at the site of the work, and the salary of any other persons employed in the main office or in any regularly established branch office of the Contractor.

c) Overhead or general expense of any kind, except as those may be expressly included.

d) Interest on capital employed either in plant or in expenditures on the work, except as may be expressly included.

attestation clauses, with lines for the signatures of the parties to the agreement. In the case of corporate parties, acknowledgment clauses may follow the signatures.

As a rule, the first article recites the work to be done and the documents forming the contract. This should include reference to the work to be completed, the proposal and its date, the owner's letter of intent and its date, the various sections of the specifications and its date, and who edited the specifications, the drawing file number and sheet numbers and their dates, along with revision dates, if any, the property survey by whom prepared and its number and its date, and also mention that any other drawings or data covering the job, as may be provided during the course of construction, are also included.

Another paragraph in this article should point out that the proposal or letter of intent, specifications, and drawings are made a part of the agreement and that if anything in the proposal or the specifications is inconsistent with the agreement, the agreement will govern.

An article should be included outlining the lump sum price involved for the completion of the specified basic work provided for in the agreement, and it should also state what percentage of the value of the work performed up to a billing date can be billed and when the remaining or the retained percentage becomes payable.

Outline the basis on which the contractor is to be compensated for "extra" work. This article should also cover the basis of the accounting system which shall apply in accumulating the costs of labor, material, equipment rental, etc., involved in the extra work.

Cover the issuance of change orders for extra or omitted work. This should be tied in with the specifications.

An article should be included which outlines contractor's financial responsibility.

All prime contractors hire subcontractors to do work which the prime contractor is not accustomed to performing. The status of these subcontractors should be covered in an article, which should also point out that the prime contractor shall be in full authority for the general management of such work.

It is advisable to insert an article clarifying title to work during the progress of construction.

Although the specifications may fully cover indemnity to owner and all insurance details, as well as waivers of mechanics' liens, etc., these covenants should be included in the agreement to emphasize the liabilities of the contractor to the owner and to tie the agreement in with these paragraphs in the specifications.

You should include an article that definitely outlines the status of the agreement and states that it is binding on the parties concerned and cannot be assigned in whole or in part without the written consent of the owner.

The agreement can then be ended with an article indicating the effective date, which is followed by the testimonium clause and signatures.

We have outlined the covenants covering a lump sum contract. If it is to be a time and material job, either with a fixed fee or on a percentage basis, then the agreement must include covenants that outline the basis on which the contractor will be paid a fee and how much this fee is to be if it is fixed, the costs for which the contractor is to be reimbursed, Fig. 10, and costs which are considered part of his fee and for which he is not to be reimbursed, Fig. 11.

These long-form agreements are usually necessary where the job is large or if the work is being done by a contractor who has never worked for you before and it is desired to have a contract signed by the officers of the respective companies concerned.

Small jobs can be performed on the standard company purchase order, which is written to contain all pertinent facts. **End Part IV**

Watch for Part V which discusses the problems that arise in the field during the construction period; progress reports, final inspection and approval of completed work.

PREPLAN YOUR PAINTING PROGRAM

Result Will Be Better Coating at Less Cost

By R. E. BLEY, Consultant Supervisor, and
D. M. ROCHE, Special Service Engineer, both of E. I. du Pont de Nemours & Co., Inc.

IN THE PAST, maintenance painting too often has been performed for appearance purposes with little thought given to protection of equipment or facilities. This has resulted in relegating this important function to fill-in work.

Often we have seen unskilled men handed a paint brush during plant shutdowns and told to start painting. Under these circumstances usually no consideration can be given to preplanning, surface preparation, coating selection, and application methods. Therefore, the annual total cost of maintenance painting plus the losses due to corrosion are usually much higher than normally appreciated.

In the larger companies maintenance painting can be a multimillion dollar annual business. Realizing this, a broad organized study was initiated within du Pont in 1949 with the objective of reducing the total expenditures for maintenance painting while obtaining a higher level of protection.

This objective has become even more important with increases in capital investment, labor and material costs. It was decided that the most improvement could be accomplished on a company-wide basis, through effective utilization of new tools and techniques and judicious selection of high quality coatings.

Largely as a result of these efforts, du Pont's actual cost for painting has decreased more than 20 per cent in the years 1953 to 1957. This is an especially significant improvement in view of the increase in the number of du Pont plants, the large expansion programs completed at existing plants, and increases in labor and material unit costs.

There were many facets which had to be considered in a long-range program of this magnitude. However, primary emphasis has been placed on engineering evaluations of new coatings, equipment, and techniques as they became commercially available and, wherever possible, during their development phases. These covered the three major phases of maintenance painting, namely: (1) Selection of proper coating materials; (2) Good surface preparation; and (3) Application of a pinhole-free coating of the required thickness.

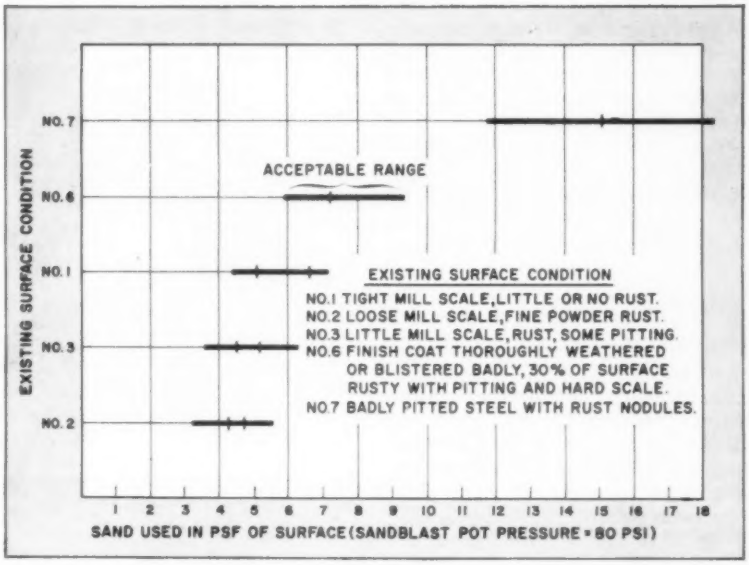

EXISTING SURFACE CONDITION
NO. 7
NO. 6
NO. 1
NO. 3
NO. 2
ACCEPTABLE RANGE
EXISTING SURFACE CONDITION
NO.1 TIGHT MILL SCALE, LITTLE OR NO RUST.
NO.2 LOOSE MILL SCALE, FINE POWDER RUST.
NO.3 LITTLE MILL SCALE, RUST, SOME PITTING.
NO.6 FINISH COAT THOROUGHLY WEATHERED OR BLISTERED BADLY, 30% OF SURFACE RUSTY WITH PITTING AND HARD SCALE.
NO.7 BADLY PITTED STEEL WITH RUST NODULES.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
SAND USED IN PSF OF SURFACE (SANDBLAST POT PRESSURE = 80 PSI)

Fig. 1. Graph indicates amount of sand required for sandblasting various surfaces.

Field tested and proven techniques were introduced to the plants through such media as the Company Protective Coatings Committee, painting surveys, specialized training progams, and engineering standards and specifications.

The Protective Coatings Committee—consisting of representatives from the central engineering department, company plants and du Pont's Fabrics & Finishes Department—has spearheaded the introduction of these new developments.

In analyzing our painting problems in more detail, it appears that in general our premature paint failures have been caused by inadequate surface preparation or application rather than by deterioration of the coating itself. Painting labor represents approximately 85 per cent of the total painting labor and material cost.

For these reasons, we generally prefer to use conventional coatings, which have a greater tolerance in regard to surface preparation and application, instead of the specialty coatings which often demand excellent surface preparation and pinhole-free application.

This does not mean that we are not interested in good surface preparation. In fact, the reverse is true. These considerations have guided our efforts in the direction of improving surface preparation and application since these are major factors in the life of any coating. For control purposes, we have also been interested in inspection techniques.

Surface Preparation—In regard to surface preparation, the degree of cleaning required is largely a function of the exposure involved and its effect. In general, we like to subdivide exposure conditions into three categories:

1. Interiors of office buildings, warehouses, etc., where essentially no corrosive exposure is involved. In this case, protection is of minor im-

portance and painting is primarily of a decorative nature.

2. Exposure to a normal outdoor atmosphere without any severely corrosive fumes. Here a brush-off sandblast or hand cleaning to remove all corrosion products and loose mill scale should be adequate.

3. Exposure to severely corrosive conditions. In these locations steel should be sandblasted or pickled to a commercial finish which requires complete removal of all rust and scale but does not require removal of the gray oxide binder.

Sandblasting has long been accepted as the best of all cleaning methods, and in many cases it is mandatory to long coating life. Although it is recognized that there are some locations where sandblasting is impractical, there are many cases where it could be used except that it is considered too expensive.

Sandblast Costs

Preliminary investigations showed that within du Pont, sandblasting costs varied greatly at different locations. This may be understandable as sandblasting is a process with many inherent variables which make gaging the performance of a given operation difficult.

We have found that large structural steel shapes and plates can be sandblasted to a commercial finish for approximately ten cents per square foot. A commercial finish generally provides a very acceptable surface for coatings. It has also been established that sand usage per square foot can be used as a guide to blasting performance.

Figure 1 indicates sand usage for good blasting performance. This is dependent upon the ability to recognize the existing surface conditions. If sand usage is not within the range shown, check these items:

1. Setting of sand flow valve or orifice. (This assures proper sand flow per hour for the nozzle used.)
2. Air pressure at sandblast pot.
3. Air supply volume.
4. Nozzle and sand hose size.
5. Operator technique.
6. Sand type and sieve analysis.

The type and particle size distribution of the sand used influences the cleaning rate and the resultant surface profile or anchor pattern. In most cases, fine sand cleans faster than coarse materials, but coarse sand is required to remove heavy scale. Also the coarser the sand, the rougher the profile obtained. A two mil profile is desired for maintenance painting as it provides an adequate pattern and can be well covered when a total dry film thickness of five to six mils is applied.

For locations where blasting is not practical, other cleaning methods must be used. Although it would be ideal to establish one cleaning method for all maintenance painting, unfortunately there is not any one "cure-all." To realize the most benefit, a thorough knowledge of all available techniques is required and the best selected for each situation.

Several new portable power tools appear to have potential use for surface preparation. One tool consists of a series of flexible steel blades as shown in Fig. 2. It can be used for cleaning masonry surfaces, such as building walls, and large steel surfaces, such as tanks. It is not suitable for removing tight mill scale, for cleaning in crevices or pits, or for use where sparks cannot be tolerated. Although the operation is not hazardous to the operator, the area being cleaned should be roped off and limited to one mechanic at a time as a safety precaution.

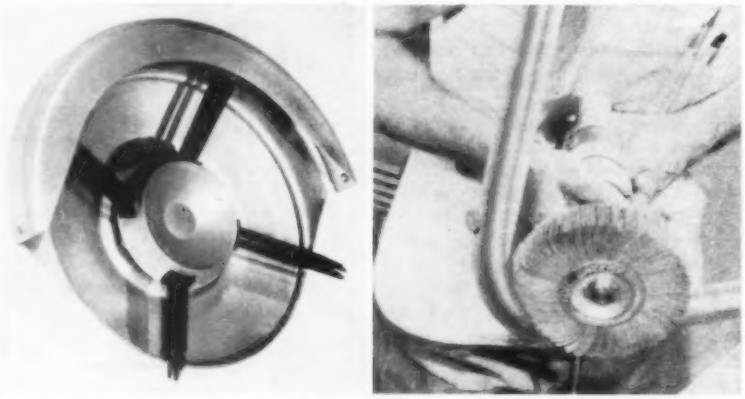


Fig. 2. Surface preparation is easier thanks to these and other power tools available to industry: flexible steel blade tool, left, and flexible sanding disc, right.

Another new power driven hand tool utilizes a series of abrasive leaves fastened radially to a common hub, Fig. 2. The abrasive leaves are close together, so the tool has the appearance of a solid wheel; but it can, in use, conform to contoured surfaces. Potential uses include smoothing of hand rails, cleaning pipe and conduit, and sanding stepped wooden surfaces.

The older standbys, such as power driven sanding discs and wire brushes, are also offering new promise. For example, new brush construction, increased knowledge of proper surface speeds, and the availability of new lightweight pneumatic drives provide a combination that is very acceptable to the painter. For heavy scale, vibrating single and triple pneumatic scalers also have a place.

To look into the future, consideration must be given to the development of new techniques which will clean to the degree of sandblasting without the limitations of blasting. This is perhaps the area of greatest potential in maintenance painting.

Very interesting alternatives to sandblasting that may come into greater use are in a broad range from chemical cleaning to high pressure hydraulic cleaning.

Paint Application — Good surface preparation is of little value unless the same attention is given to application of a good quality non-porous paint film of adequate thickness. Fortunately, recent developments in methods and equipment permit the attainment of good quality application of thin film paints.

One important development in paint application methods has taken place in the past few years. This is a method that involves heating of the paint and applying it with spray equipment. The advantages of applying heated paint by the spray method as compared to hand brushing or cold spray method in maintenance can include the following:

1. Reduction or elimination of pinholes in the coating film.
2. Increased dry film thickness per coat allowing a six mil system to be applied in two coats.
3. Increased film thickness on sharp edges and corners (Considered the most critical locations).
4. Higher application rates in terms of coating thickness per square foot per man-hour.
5. Less overspray (less air or no

air required for atomization) depending on the equipment used.

6. Faster drying time for equivalent film thicknesses, thus minimizing contamination between coats.

7. More uniform film through better flow-out which results from lower and more consistent viscosity.

The advantages of this method can be restated simply as (1) a more uniform and thicker film, (2) lower labor costs, (3) less overspray.

Evolution of hot spray equipment from the cold spray equipment has been relatively rapid. Figure 3 illustrates a conventional cold spray system. A similar non-recirculating hot spray system is also shown. An electrically heated hose or hot water jacketed hose is required to maintain uniform temperatures at the spray gun during intermittent use such as in maintenance painting.

A further development in hot spraying is airless hot spraying. See Fig. 3. The airless hot spray or pressure system appears to offer the following two additional advantages over air atomized hot spray: (1) further reduction of overspray, and (2) faster rate of application.

As a case history, airless hot spray has been used to paint textile spinning room equipment in operation. This would have been an impossibility a few years ago; in fact, it would not have been considered. Contamination that would result from overspray using conventional cold spraying equipment would have necessitated shutting down almost the entire spinning room and covering the other machines.

Using airless hot spray, the rate of paint application is quite interesting. Only four painters applied a seven mil wet film coating (three mils dry) on a spinning machine using 16 gallons of paint in 50 minutes. Previously, hand brushing took over five times as long and resulted in an inferior job.

In airless hot spraying the paint is pumped at a pressure of approximately 600 psi and is mechanically atomized. Properly adjusted, it can be atomized as finely as when using air. However, with the elimination of the expanding air at the nozzle and air interference at the surface to be coated, overspray is minimized.

As is the case with many new developments we have had an occasional difficulty in hot spraying. For example, the use of portable hot spraying equipment requires an electrical power supply for heating the paint (approximately three kw) and this load is well in excess of the conventional 15 amp, 110 v outlet.

Drying Time

In shop work, drying time for rehandling must be considered with the thicker coatings. While hot spraying tends to dry thin film coatings faster, the application of heavier films desirable for maintenance work results in increased drying time.

We have found that previous drying time data for thinly applied cold applications are not neccessarily accurate for heavier applications applied in fewer coats. Fortunately, this is of little importance in most of our plant maintenance in-place applications as a fast drying primer can be used and the drying time of the top coat is generally not critical.

Where spray equipment cannot be used, we have had very satisfactory results through the use of rollers, including the pressure-fed types. These are particularly advantageous for large walls, and ceilings, and often satisfactory hiding power can be obtained in one roller coat which may not be possible with one brush coat of the same paint. With rollers, office painting costs can be considerably reduced even with some brush work which is usually required for corners and moldings.

Recently both hand-dip and pressure-fed contour rollers have become available commercially. Although we have no experience to date with the contour units, we are planning to evaluate the pressure-fed type for painting pipe and conduit.

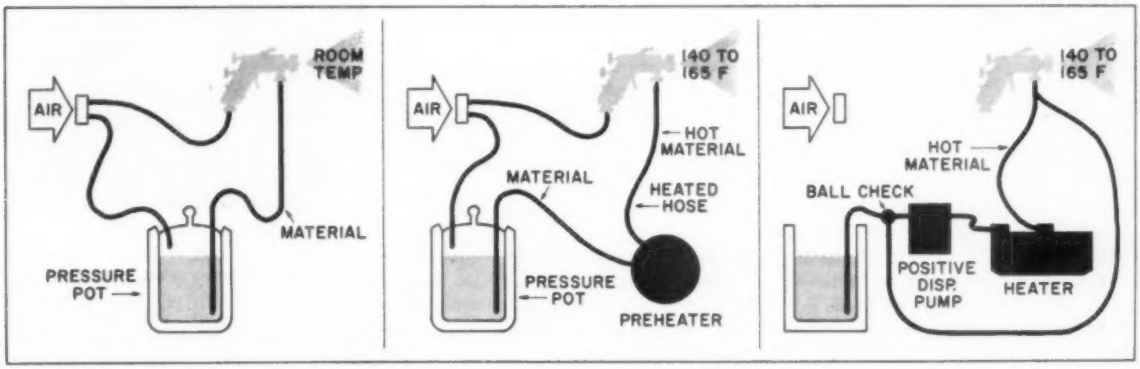
Inspection and Quality Control—Along with the new developments in equipment for applying paint, there have been major advances in gages and equipment for inspection. Of primary interest are the wet and dry film gages, and pinhole detectors. With the development of these inspection devices, it is now practical to specify film thickness rather than the number of coats.

In general, a three mil prime coat is recommended for most of our installations. This permits coverage of a two mil profile substrate with a safety factor of one mil. A two to three mil top coat above the primer to result in a minimum of four mils coating thickness is considered minimum for adequate protection in many of our chemical plants.

The primary function of a wet film gage is to control film thickness during application. Knowing the dry film thickness desired and having established the dry to wet film ratio for the specific conditions, the wet film thickness can be readily determined. With this information the painter can easily check the wet film thickness and be assured that the required dry film will be obtained.

Wet film gages are very simple instruments which can be used satis-

Fig. 3. Here are several examples of the cold and hot paint spraying systems. At left, is the conventional cold spray system; in center, the hot spray system; and, at right, the airless hot spray system which offers additional advantages.



factorily by the average painter with only a minimum of instruction. These gages, Fig. 4, are available commercially. Because of their value, low cost, and simplicity, many of the plants provide each painter with such a gage.

Dry film gages of the magnetic flux type are manufactured by several concerns. A typical one is shown in Fig. 4. The instruments can be obtained in several thickness ranges. A 0-25 mil instrument covers the range well although the 0-10 mil unit meets the limits of most coating systems and provides greater accuracy. Some of the newer models provide a dual range.

In addition to proper film thickness, a good coating must be free of pinholes. Pinholes in the film serve as focal points which expose the bare substrate to the surrounding atmosphere, and can cause early failure. Depending on the corrosiveness of the atmosphere, underfilm corrosion can progress and cause complete failure of the coating in a short period of time.

Compact battery operated pinhole detectors for metallic substrates are also commercially available. In use, one side of the electrical circuit is attached to the base metal of the item being inspected and the other side of the circuit is the sponge electrode which is dampened with water. An audible alarm indicates the presence of pinholes when a circuit exists between the sponge electrode and the substrate, Fig. 4.

Engineered Painting — We have discussed several basic requirements for good maintenance painting. The selection of a good quality suitable paint, proper surface preparation, effective application, and inspection must be supplemented by sound planning in order to minimize painting costs on a dollar per square foot per year basis.

The primary aspects of planning as applied to maintenance painting work can be considered as (1) preventive painting to minimize surface preparation cost, (2) painting forecasts, and (3) painting history to establish trends in both serviceable life and cost.

In view of the high cost of surface preparation, it is essential that repainting be done prior to extensive coating failure. This is a matter of economic balance between the cost of periodic inspection and more frequent repainting, and substantially lower surface preparation costs.

This is the approach we often refer to as "preventive painting." The availability of dry film thickness gages and porosity detectors makes this approach practical. The extent of application of this approach can range from spot touch-up work to repainting extensive areas.

To effectively accomplish preventive painting, a semiannual forecast has been found very desirable. This permits both a winter and a summer schedule thereby segregating indoor and outdoor activities which can result in a better balance for the labor force.

Another useful aid in this work is a painting history system covering all critical areas and significant jobs. This can be maintained either manually or by mechanized equipment. Typical information required in the history file includes:

1. Item painted (building walls, structural steel, tanks, etc.)
2. Material painted (steel, masonry, wood, etc.)
3. Exposure (weather, fumes, chemical spills, etc.)
4. Purpose (protective, decorative, etc.)
5. Present condition (surface condition prior to cleaning)
6. Surface preparation method
7. Surface condition after cleaning
8. Coating system (primer, intermediate coat, etc.)
9. Application method
10. Area coated in square feet
11. Film thickness of each coat
12. Scaffold and rigging man-hours
13. Surface preparation man-hours
14. Application man-hours

This sounds like and is an imposing list. However, at least two-thirds of the items should be known regardless of the system and the remaining items can be estimated. Therefore, an effective history system generally can be established simply by organizing the data on one form which can be used as a work order, instruction sheet, and data record. With this information, cost comparisons can be made on a dollar per square foot per year basis.

To initiate a program of this kind, several approaches can be considered. These include protective coating meetings, surveys of plant coating conditions, development of engineering standards and specifications for surface preparation, coatings, and application, and specialized painter training. These are the methods we are using to apply these techniques today for a longer life and lower cost coating performance tomorrow. **End**

DRY FILM GAGE

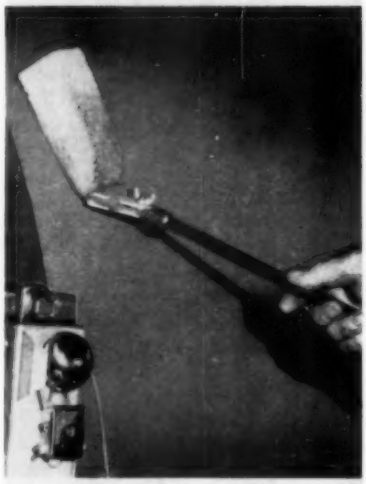
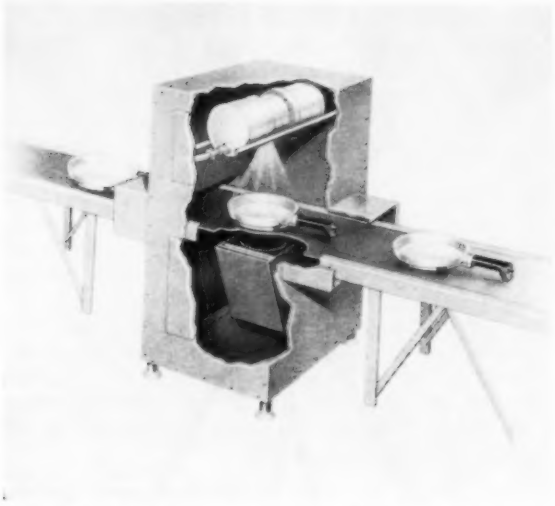

PINHOLE DETECTOR

Fig. 4. To check on paint thickness, you can avail yourself of the following equipment: top, wet film gage, center, dry film gage. Pinhole detector, bottom, warns when pinholes are present.



This simplified cut-away illustrates a TVX installation now in operation at one of the country's leading appliance manufacturers. Automatic electric fry pans are passed under the TVX x-ray generating unit and over the camera unit to determine whether or not the heating elements are perfect.

Here's the image at the other end of the TVX installation. Shown on the screen are heating element terminals and thermostat assembly of the electric fry pan. The operator, who can be seated at the monitor as far as 1400 ft away from production line, can view the image in a lighted room.

TVX—
X-Ray for Automated Quality Control

ANOTHER MAJOR step in automated quality control was unveiled recently when the X-Ray Department of the General Electric Company, Milwaukee, demonstrated the latest in television x-ray, the TVX x-ray image intensification system. The new system permits economical 100 per cent product inspection on a television-type screen, 10,000 times brighter than a conventional fluoroscopic image.

Unlike ordinary fluoroscopic inspection which requires the inspector to work in a darkened room or area and then for only relatively short periods of time, TVX is bright enough for easy viewing in normally lighted areas. The viewing monitor provides the product inspector with an image size which is electronically variable from ½ to 3 times that of the original object. This enlargement is possible without greatly affecting sensitivity. Product inspection viewing up to 1400 ft distance between monitor and camera is now possible.

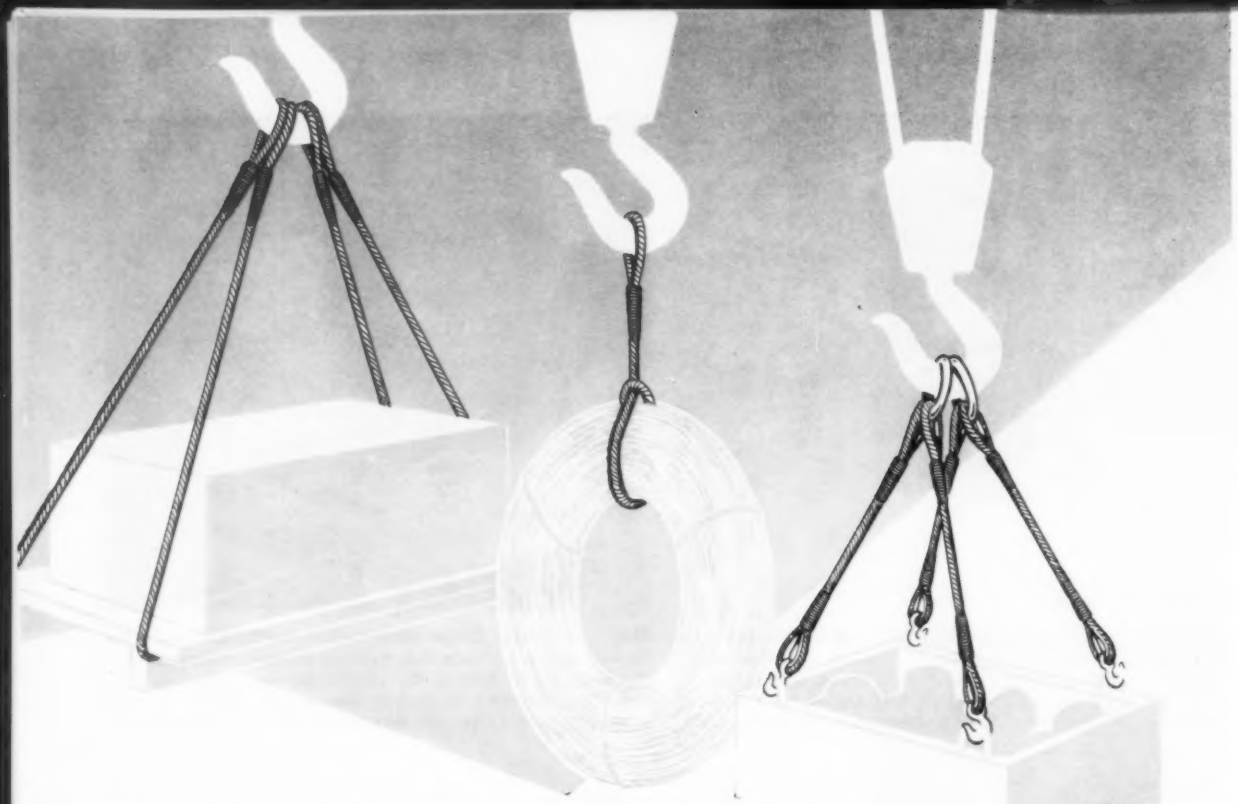
TVX consists of three basic units, the x-ray sensitive camera, the control unit and the viewing monitor. All controls required for routine operation are located on front panels of the control and monitor units. The system can be used with any standard x-ray generating apparatus and materials handling or positioning equipment provided by the user.

Camera unit consists of an x-ray image pickup tube, horizontal and vertical sweep subchassis and preamplifier subchassis.

TVX camera tube is said to be the key to the success of the image intensification system. This new x-ray sensitive camera tube allows direct transfer of x-ray energy to electron energy capable of being displayed on a TV monitor. The camera tube eliminates three energy conversions which formerly contributed to a high noise level.

Control unit consists of 5 subchassis contained in a metal cabinet equipped with ventilating screens. A blower circulates air to protect components from over-heating. These subchassis units are rectifier, regulator, video, sync and blanking. Each is easily removed for servicing. Easy-to-set controls are provided for "gain," "target voltage" and "on-off." Installation and service controls are also provided for "focus," "beam current," "size balance," "horizontal centering," "vertical sizes" and "centering."

The viewing monitor is provided with a 12-in. picture tube plus chassis with circuitry to translate the electrical image into a visual image and to provide high voltage for the picture tube. All components are housed in a metal cabinet equipped with ventilating screens. **End**



WIRE ROPE SLING STUDY

Here Are Tips and Data On Correct Usage

By F. W. VON WEHRDEN, Engineer, Sling Div., Broderick & Bascom Rope Co., St. Louis, Mo.

SELECTION of the proper sling for any lift requires consideration of many factors such as safety, ease and speed of handling, life expectancy of sling and cost.

First, consider the types of hitches. See illustration above.

Choker Hitch. This is a contact sling hitch in which the sling passes entirely around the load. In its simplest form, the sling has a loop or eye on each end, and is referred to as a choker sling or choker. One loop is passed through the other forming a slip noose. The hitch is usually used singly and has a rated capacity of 75 per cent of full strength of the sling.

Basket Hitch. A choker sling is passed under the load, both loop eyes going to the crane hook. Chokers are used in pairs where load is carried suspended and singly where one end of load must be raised. Load rating can and does vary. A safe figure is double that of a choker hitch where square corners are encountered. Rating must be reduced if sling legs deflect from a vertical position.

Another method of calculating the load rating of a basket hitch is doubling the load rating of a single direct connected sling. This figure should be reduced for sharp bends or other conditions which do not occur in a vertical sling.

Directly Connected. This hitch is made directly from the crane hook to the object to be lifted, usually being attached to the load by means of a hook or shackle. A directly connected hitch can be made with more than one sling leg. When two or three leg slings are used, the center of gravity of the load will be directly under the crane hook on a freely suspended load.

Leg lengths must be accurate if the object is to hang level. In a four-leg sling, any variation in leg lengths, when attached to a rigid load, could throw the entire load on two legs, the other two legs merely restricting the load from overturning. If the hookup is such that two, or even three legs of the sling are taking the load, the safety factor is reduced. In flexible loads, such as long wide steel plate, this condition is not as apt to occur.

Turning or Rolling Loads. When it is necessary to roll a load, it is essential to determine the type of sling to be used and also the type of hitch. It is of utmost importance to see that the sling rolls with the load. As an example, turning an open-end load such as a boiler could be handled by using two endless ropes forming a basket hitch around the load.

The opposite wire rope loops would engage sheaves on the crane hook. If the article handled is unbalanced so that it might roll suddenly of its own accord dur-

ing the turning process, it is necessary to provide additional means to control its movement.

When the object to be turned over is in the form of a ring, the procedure is identical except a choker sling is threaded through the opening and through the sheave. After this both ends of the choker are then connected together with a shackle or link forming an endless sling. As this connection will not pass around the sheave and might damage the object to be turned, the movement is limited by the length of the choker sling or the headroom.

Avoiding Abrasion

A basket hitch made with a choker sling having both loops in one crane hook should not be used for turning loads because of the inevitable movement of the load against a small portion of the sling. This movement causes abrasion of the individual wires in the rope and possible actual failure of the sling. Where two crane hooks are available, a pair of two-legged bridle slings should be used, one placed to unwrap while the opposite sling wraps around the load. Slings should not be attached to the ends of a rolling load if either slippage or rubbing of the load against the sling will occur.

Safety Factor. This is the number of times the recommended safe-working load is multiplied to equal the ultimate or breaking strength of the sling. Wire rope slings are recommended for use at a safety factor of 5. This margin of safety is designed to take care of any overload that cannot be foreseen, such as shock loads, incorrect use or other unusual conditions. Catalog ratings are based on new slings. Load ratings on worn slings should be reduced.

Sling Angles. At the present time, sling angles are shown in three different ways in various catalogs. Regardless of how the sling angle is stated, or the method used to figure the stress in a sling leg, the load rating should be the same.

The following description applies to the included angle measured between one sling leg and a plumb line suspended from the hook. A lot of misunderstanding results from the change in carrying capacity of a sling when the leg angle is changed. Actually, there is no change in the tensile strength of the sling leg. What happens is that the operator is picking the load straight up, or vertically but the sling leg is pulling at a disadvantage. For quick figuring in the shop, a 30-deg included leg angle causes a loss in lifting capacity of 15 per cent, 45-deg leg angle 30 per cent and 60-deg leg angle 50 per cent. Not 100 per cent accurate but easy to remember and slightly on the safe side.

It is always good practice, within limits, to keep the sling leg angle as small as possible. However, the length and width of the load, the sling leg length or the available headroom sometimes determine the sling leg angle.

It is neither economical nor good practice to exceed a 60-deg sling leg angle. Angles greater than 60 deg not only build up tension in the sling legs out of all proportion to the weight of the load, they also create a much greater "in-pull" on the ends of the load. This produces eccentrically loaded column effect. Long slender objects have a tendency to buckle. Included angles greater than 120 deg indicate some thought should be given to the use of a lifting beam in connection with the lift.

Safe load ratings on slings are misleading unless the sling angle is stated. A sling that will handle 10 tons at 15 deg included leg angle will only handle 5 tons if the angle is increased to 60 deg.

Table I. At constant load of 1000 lb the stress on each of two sling legs goes up with included angle increase.

Included Angle	Stress Per Leg	Included Angle	Stress Per Leg
0	500	50	778
10	508	60	1000
20	532	70	1462
30	577	80	2880
40	653		

Shock Loads. Crane hooks should be started slowly until the sling becomes taut and has the load suspended. The lifting or lowering speed of the crane should be increased or decreased gradually. Sudden starts or stops place heavier loads on the sling. This action can be reasonably compared to jamming the brakes on a speeding automobile.

Watch Weight

Always study your load and determine the weight and the strength of the connections. Never underestimate the weight. If you are attaching the sling to lugs, are they heavy enough to take the load? Always use a sling of ample capacity. Broken bones or lost time costs more than the most expensive sling on the market today.

Sling Rope. Wire rope used for sling purposes is usually of improved plow steel grade of either 6 by 19 construction or 6 by 37 construction. There is very little saving in cost in using rope of less tensile strength as the labor involved in making a sling remains constant. Similarly, there is no real economy for using old hoisting ropes to make slings. If a rope is no longer serviceable as a hoist rope, the mere action of splicing loops into the ends reduces its strength still further and it is of little value in picking up heavy loads. In fact, it is a used sling from the very start.

Catalogs give the proper load

rating for ropes. When no catalog is available, the approximate safe-working load can be figured. Simply square the diameter and multiply by 8. The answer is the working load in tons. This must be reduced by the efficiency of the splice for a straight pull-to-pull load. Other reductions must then be made for the type of hitch, or the leg angle.

Slings made of 6 by 19 rope have 114 individual wires running the entire length of the rope. This means that the failure of a single wire reduces the strength less than one per cent. With 6 by 37 construction having 222 wires, the failure of a single wire reduces the strength less than ½ of 1 per cent. Assuming your load to be suspended by a rod, its failure would be 100 per cent or disastrous.

While the rope is oiled during manufacture, overloads cause the rope to pull down in diameter, squeezing the grease out. If this happens to any great extent, the sling should be given an occasional coating of light oil to prevent rust. A rusted rope sling has lost its resilience and should be discarded.

Pulling a sling from under a load will curl it. This effect is greater in slings having a small number of wires, or lesser flexibility.

Braided Safety Slings. The number of parts in a braided safety sling can be from 3 to 32 parts, braided into either a round or a flat section. The usual and most often used, braided sling is made of 8 part construction. Its construction gives it a flexibility far beyond any standard sling. Its capacity ranges from the smallest to far beyond the largest standard sling. Its ease of handling, resistance to slipping or kinking cannot be equalled. And, it gives ample warning of any possibility of failure.

Bending. Bends around sharp corners create a high stress concentration in a sling. The usual result is a deformation of the sling body or a possible kink. Flattening of the sling in the loops can be avoided by the use of thimbles. Where a sharp bend is unavoidable around the load, suitable corner protectors, designed to increase the radius of bend and spread the load over a greater arc of contact with the sling are desirable. Protector arcs increase sling life and reduce costs.

Good protector arcs should have a radius of at least five times the rope diameter. But even a block of hardwood on each face of the object at the corner, is better than nothing at all.

Fittings. Plain loops can be clipped, spliced or swaged. Thimbles should be used to prevent wear to the actual rope. Thimbles can be used with a variety of fittings such as hooks, shackles, links, rings, turnbuckles and plate clamps. Where a loop is not desired, the rope ends can be fitted with either open or closed sockets. Where sockets are used, they should be attached with virgin zinc after the rope has been cleaned of all foreign matter. In putting on a socket correctly, cleanliness becomes absolutely necessary if you want a good job.

Hooks. Any hook is simply a curved beam and the strength can be calculated on that basis. You will often see hooks on which the load is suspended on the point. When used in this manner, the stress set up in the hook reduces the load carrying capacity as much as 50 per cent. Side pull on hooks also sets up a bending action that reduces its lifting power.

This is also true of connections attached permanently to the load itself. These connections vary in size, shape. Cast lugs, eye bolts or "U" bolts are in this category.

Table II. Fittings and efficiencies.

Fittings	Per Cent
Swaged fittings and sockets	100
Wedge sockets	80-90
Clips* (4 to 6)	75-80
Thimble Splices	
(Rope diam, in.)	
3/8 - 3/4	95
7/8 - 1	90
1 1/8 - 1 1/2	80
1 5/8 - 2 1/8	75

*Clips should always be installed with the "U" bolt in contact with the "dead end" side of the rope connection.

Sling Costs. Original or first cost is often considered very important in the selection of a sling. As there are many types, sizes and lengths of slings, first cost can vary considerably. When you consider conditions of usage, sling life, time saved in handling, safety and all the considerations that go along with them, the saving in first cost can be offset by the purchase of the best sling for the job in a very short time. Accidents cost a company far more than the best slings.

Discarding Slings. The question, when should a sling be scrapped is often asked. While there are many ideas about this, a competent user, with the complete history of the sling in question is best able to decide this. But when the possible dollars and cents value of any damage caused by a dropped load, due to sling failure, exceeds the cost of a replacement sling, the correct answer should be obvious. When in doubt—replace! **End**

Rules for the Reduction of Total Sling Costs

1. Overloading causes accidents. When in doubt, use a larger sling.
2. Start and stop slowly—Sudden starts or stops increase the stresses in the crane ropes and the sling out of all proportion to the load.
3. You are asking for trouble if you over-run the limit switch on your crane.
4. If possible, set the load on blocks. Pulling a sling from under a load causes abrasion and curling. Makes sling harder to handle on the next lift.
5. Sharp corners cut slings. Use protector arcs or blocking.
6. Store in dry room. Moisture or acid fumes weaken slings.
7. Use moisture-proof covering for the same reason as above.
8. Periodical inspection pays dividends.
9. Avoid handling hot material with contact slings. The strength goes down as the temperature goes up.
10. Dropping castings on slings or running trucks over them causes damage. Hang them up when not in use.
11. Use hooks properly. Point loading reduces carrying capacity.

MACHINE FOR HARDFACING OF CURVED SURFACES

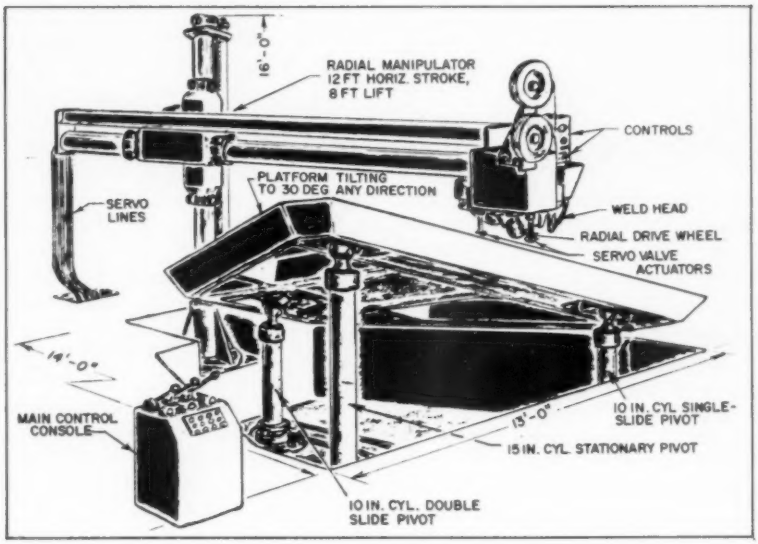


Fig. 1. Sketch of complete machine showing oscillating welding head on radial manipulator. Servo sensing rods control height and also tilt of the table.

How Maintenance or Production Facing Can Be Improved

By L. E. FARNSWORTH, Chief Design Engineer, Automation Machines & Equipment Co

PRINCIPLES involved in this automatic arc welding machine that "thinks and acts for itself" have many applications in both maintenance and production welding installations.

In this instance, here was the problem: A manufacturer of large hydraulic turbines sought some means for automatically surfacing the outer edge of turbine blades to prevent cavitation. The blades had double curvature, measured up to 14 ft across the tips, weighed up to 14 tons. Previously the surfacing was done by manual arc welding, requiring about 40 manhours per blade, leaving something to be desired in terms of quality.

Consulting with engineers of the welding equipment manufacturer, it was decided to incorporate an automatic twin-arc oscillating head into a machine with a more or less universal-type fixture table which would move the head across the blade surface at a constant speed of about 5 in. per minute and keep the surface of the work leveled continuously at the point of welding.

Since the surface to be covered was very nearly circular, mounting of the head on a radial manipulator was elementary. With the blade positioned at the proper distance from the pivot point of the manipulator, the sweep of the head could follow the arc of the blade accurately. It was also proposed to mount a friction driving wheel along with the head at the end of the manipulator. Speed of this drive when once set would remain constant.

Mounting the head in this way meant that the blade had to be positioned in space with the point of welding at a given height in relation to the head and driving roll, and that the surface of the blade be very nearly level. To accomplish this, it was decided to mount the blade on a large platform that could be raised and tilted by three hydraulic lifts. To sense the height and dictate the amount of tilt, a head containing three hydraulic servo valves was to be mounted

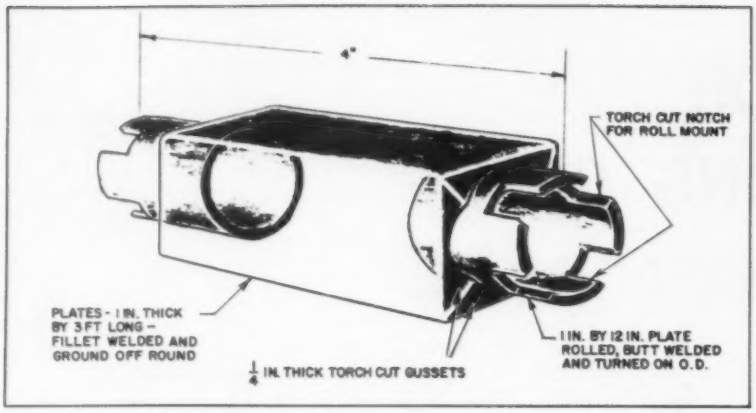

4"
TORCH CUT NOTCH FOR ROLL MOUNT
PLATES - 1 IN. THICK BY 3 FT LONG - FILLET WELDED AND GROUND OFF ROUND
1 IN. BY 12 IN. PLATE ROLLED, BUTT WELDED AND TURNED ON O.D.
1/4 IN. THICK TORCH CUT GUSSETS

Fig. 2. Simple housing weldment to accommodate 10 in. horizontal and 12 in. vertical tubes of radial manipulator. Welding head is 15 ft from vertical support.

at the end of the manipulator along with the welding unit. The end result was the machine shown in Fig. 1, covering about 250 sq ft of floor space.

Since only a single machine was to be built it was designed for welded steel construction throughout.

The manipulator, carrying the welding head, radial drive and servo sensing head, had to support about 1500 lb at a point 15 ft out from the center of the vertical column. Tubular sections being selected to resist torsional as well as bending deflections, it was dictated that they be 10 in. OD for the horizontal and 12 in. OD for the vertical members. Tracking and support of these elements is through pillow-block rollers on tubular housings. It was not possible to obtain tubular sections of sufficient size and gage for the housings, so simple weldments were designed and built, as sketched in Fig. 2.

The sensing head incorporating the three servo valves was designed also to mount the radial drive and oscillating welding head in as compact a unit as possible. The servo valves were provided with closely ground lands, so that 1/32 in. movement from center would start a pilot pressure to the main hydraulic valves and the corresponding lift piston would start its movement.

Servo valve stems were extended through the opposite side to trigger corresponding limit switches. This served a dual purpose: (1) The platform could be raised by manual controls until all three servos were deflected, at which time the servo system overpowered any manual effort and leveled the blade; and (2) in traveling across the blade and over the edge, the servo system falling off would shut off the servo system and prevent damage by stopping the rise of the platform. Radial friction driving wheel was mounted directly below the sensing head and at about center of the three sensing points. It can raise and lower, within limits, and also tip through trunnion and sliding-block mounting to permit moving across the variable curvature of the blade. The wheel is geared directly to a variable-speed rectified d-c drive mounted on one trunnion block.

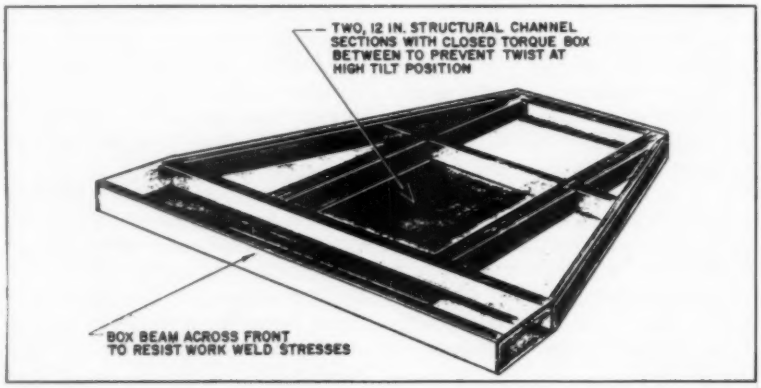
Welding head is attached to the sensing head, with the nozzle or electrode point as close to the common center as possible in the light of the physical masses and shapes involved. The wire reels, head controls and auxiliary manipulator and platform controls, also were mounted at this position so that all operations could be controlled at the point of welding.

Platform is designed as a large weldment of structural shapes and plates, the aim being to provide a sturdy support for the blade at three points and still keep the structure as light as possible to minimize cost of hydraulic lifts, pump capacity and line sizes. Beyond that, however, the platform had to embody enough structural strength to withstand the high shrinkage stresses developing from the considerable amount of weld metal deposited on the blade.

Keeping the foregoing in mind, the platform was designed with a ½-in top plate measuring 9 ft 3 in. by 12 ft, reinforced by 12-in., 20.7 lb structural channels. Two of these channels run the length of the front and are closed with plates on the bottom to form a rigid box section. Within this section are mounted the two front ball supports, one fixed and the other free to slide in one direction.

Extending toward the rear from the front box section are two closed box channel stringers, with a plate between them to form a three-cell torque box. This prevents twisting of the blade at a high tilt and the center of gravity far to one side. Remaining edges of the platform are reinforced with similar channels, but the lower side is left open. Finished weldment is sketched in Fig. 3. **End**

Fig. 3. Major welding job in the machine is this work platform. It weighs less than 10,000 lb but has ample box seams to resist shrinkage stresses in blades.


TWO, 12 IN. STRUCTURAL CHANNEL SECTIONS WITH CLOSED TORQUE BOX BETWEEN TO PREVENT TWIST AT HIGH TILT POSITION
BOX BEAM ACROSS FRONT TO RESIST WORK WELD STRESSES

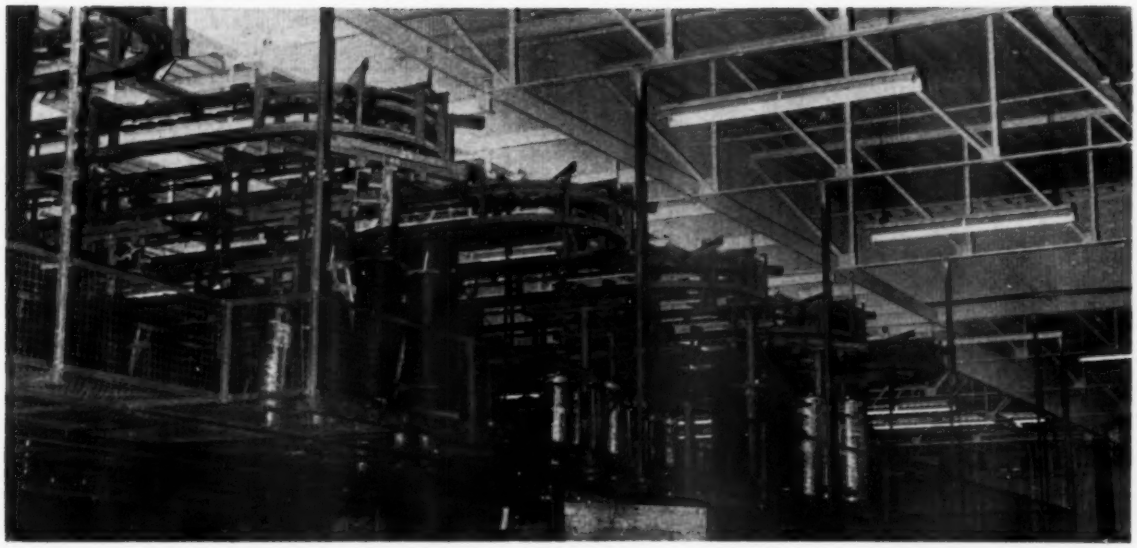


Fig. 1. View of one end of the powered section of storage conveyor. It folds back and forth a total of 2300 ft.

PLANNED-IN MATERIALS HANDLING

Plant Built Around Storage Conveyor

WHEN OFFICIALS of Day and Night Manufacturing Company and The Payne Company (both Divisions of Carrier Corporation) announced plans to build a 500,000 sq ft plant at La Puente, California, they frankly admitted their primary objective —the absolute necessity of reducing the excessive material handling costs which were inherent in the original plant.

Planning and installing this material handling equipment was not a simple plant engineering task. The company produces eight different product lines of water heating, heating, and air conditioning equipment. Most of the individual lines are manufactured in different sizes, quality models, and control adaptation for different types of gas fuels. In all, some 747 different unit variations are now rolling off the production lines.

It was evident from the first that overhead storage would be necessary to eliminate massive, space-consuming floor storage banks of water heater tanks which would also require a second handling when they were moved from the storage bank to the final assembly line. This indicated an overhead storage conveyor large enough to contain the 700 tanks produced by the enameling and galvanizing departments during the odd shift, plus a sizable safety margin.

The next problem was to devise some method for selecting the desired type of tank in the required number from this overhead storage bank whenever they were needed by the assembly line. After careful planning, it was decided that an overhead power-and-free conveyor system could be tooled in a manner to provide the desired results.

The system eventually installed is shown in Fig. 2. Basically, it consists of a 2300-ft-long overhead conveyor system moving on 4-in. I-beam tracks and powered by two 25-hp adjustable-speed motors.

The water heater tanks are not hung directly on the conveyor (as inadvertent bumping together of the enameled tanks would cause enamel chipping), but instead, are loaded four tanks of a type on platform-type conveyor carriers.

When operating at full capacity, 270 of these carriers containing 1080 tanks can be hung on the overhead system at one time. Here they circulate continuously until needed by the final assembly line.

An integrated system of coded signal flags, automatic switches, two combination elevator-lowerators, a shunted conveyor track, and a free spur spring pusher bank conveyor are used to place loaded carriers onto the powered section, and to remove specific types of tanks in specific numbers for use by the final assembly line. The lettered stations on the ac-

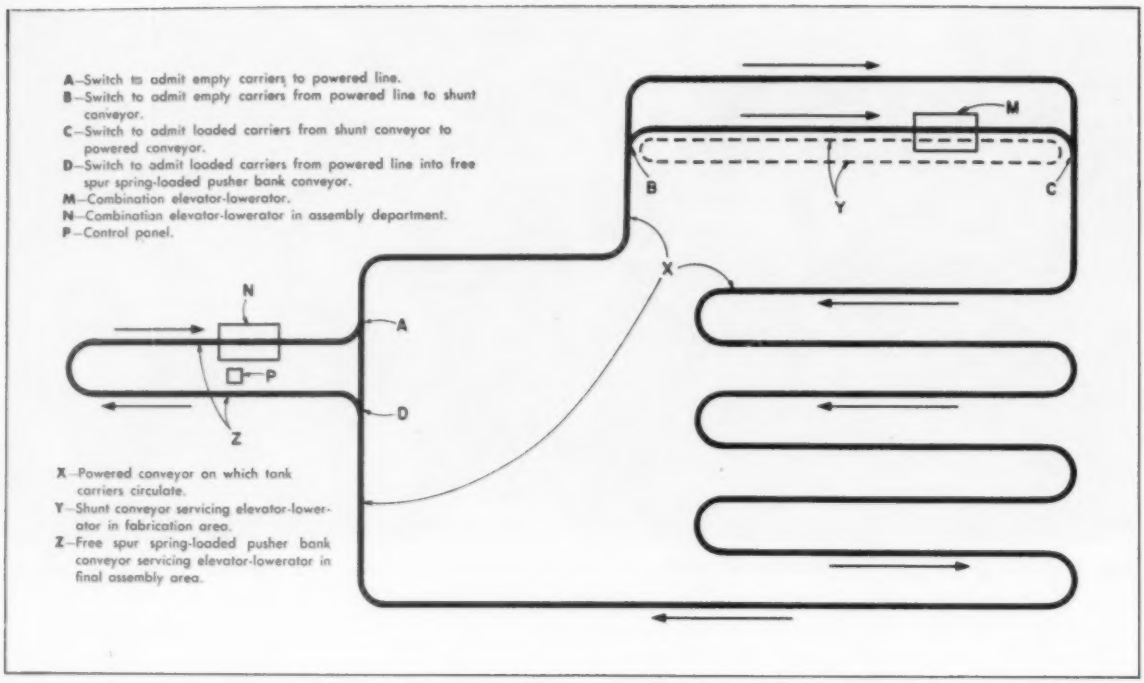

A—Switch to admit empty carriers to powered line.
B—Switch to admit empty carriers from powered line to shunt conveyor.
C—Switch to admit loaded carriers from shunt conveyor to powered conveyor.
D—Switch to admit loaded carriers from powered line into free spur spring-loaded pusher bank conveyor.
M—Combination elevator-lowerator.
N—Combination elevator-lowerator in assembly department.
P—Control panel.
X—Powered conveyor on which tank carriers circulate.
Y—Shunt conveyor servicing elevator-lowerator in fabrication area.
Z—Free spur spring-loaded pusher bank conveyor servicing elevator-lowerator in final assembly area.
M
B
Y
C
X
N
A
P
D
Z

Fig. 2. Flow diagram of materials handling system showing switches, elevator-lowerators, powered and shunt conveyors.

companying diagram will clarify this operation.

Each conveyor carrier is equipped with a set of coded signal flags which are set to indicate that the carrier contains one of 24 different types of water heater tanks, with a 25th position to indicate that the carrier is empty.

These signal flags are set at the time four tanks of a type are loaded on the carrier in the elevator in the tank fabrication section. They are re-set to show that the carrier is empty after the tanks have been unloaded from the lowerator near the start of the final assembly line.

Follow a Cycle

The same flags actuate the automatic switches which transfer the loaded carriers from the shunt track section onto the main powered line, then off again onto the free spur when needed for assembly.

To clarify this operation, let us follow a single conveyor carrier throughout its cycle of being loaded, circulating on the powered section, transferring to the free spur, unloading, and returning to the beginning of the cycle.

Tanks arrive at the elevator in the fabrication section via roller conveyor from the enameling and galvanizing operations. Four tanks of a kind are placed on a carrier which is bottomed in the elevator. The coded signal flags are set to indicate the type of tank contained, then the operator actuates a switch which elevates the carrier to the shunt section of conveyor track.

The carrier then moves outward on this shunt conveyor to the switch which will admit it to the powered section. Here it remains until an open space on the powered line arrives. The switch then actuates automatically, admitting the loaded carrier to the powered line. Here it circulates continuously until the type of tank it contains is called for by the final assembly line.

When the final assembly department calls for a specific number of a specific type of tank, the lowerator operator in the assembly department first pushes a button to indicate the type of tank needed. This adjusts the switch leading into the free spur conveyor so that it will be actuated only by those coded signal flags on the carriers containing the desired type of tanks.

Another switch is then pushed which operates an automatic counting device, so that after the needed number of like tanks are delivered to the free spur, the original order is nullified and the remainder of the tanks similar to those ordered will bypass the switch and continue to circulate on the powered section.

Storage Section

As many as 35 carriers containing 140 tanks can be stored in the free spur section. The entering carriers feed along the first part of the free spur by gravity until just before they enter the lowerator. At this point they enter the spring pusher bank section which indexes them into the lowerator as required.

To return to our specific carrier (which was loaded a few paragraphs back), when the tanks loaded on this carrier are needed by the final assembly line, its coded signal flags intercept and actuate the switch which transfers it onto the free spur line.

Here it takes its turn with

other carriers containing the same type of tank in being lowered and unloaded. The flags are then re-set to show that the carrier is empty, and it is elevated onto a remaining short section of the free spur.

Flags Open Switch

It waits there until an empty space comes along on the powered section, then an automatic switch admits it to the line. It travels around to the switch leading to the shunt conveyor, which services the elevator in the fabrication section, where its "empty signaling" coded flags open a switch which admits it into the shunt section.

Next, it takes its turn in line with other empty carriers until it is lowered, loaded, elevated, and starts re-circulating again.

It should be noted that whenever the free spur section, or shunt conveyor section, is already filled with carriers, the switches will not actuate and loaded carriers, even though containing the type of tank desired, bypass the free spur section, while empty carriers bypass the shunt section.

The power-and-free system, its controls and switches, are electrically operated throughout. This applies also to the elevator-lowerator units. Conveyor speed can be adjusted between 25 and 75 fpm, dependent upon the desired speed of bringing a water carrier into position for transfer to the free spur. Tank carrier circuit times vary from approximately 30 to 90 minutes. As this conveyor does not operate through any processes or painting operations, and because the rollers are equipped with sealed bearings, automatic conveyor lubrication is not used.

An 11½-ft clearance exists between the bottom of the carriers and the floor. A 2-in. mesh wire protective screen is installed underneath the entire system and 10 ft above the floor. Elevator-lowerator units are operated by 3 hp two-speed motors. The entire conveyor system is supported from the building roof trusses, thus eliminating any floor obstructions whatsoever. **End**

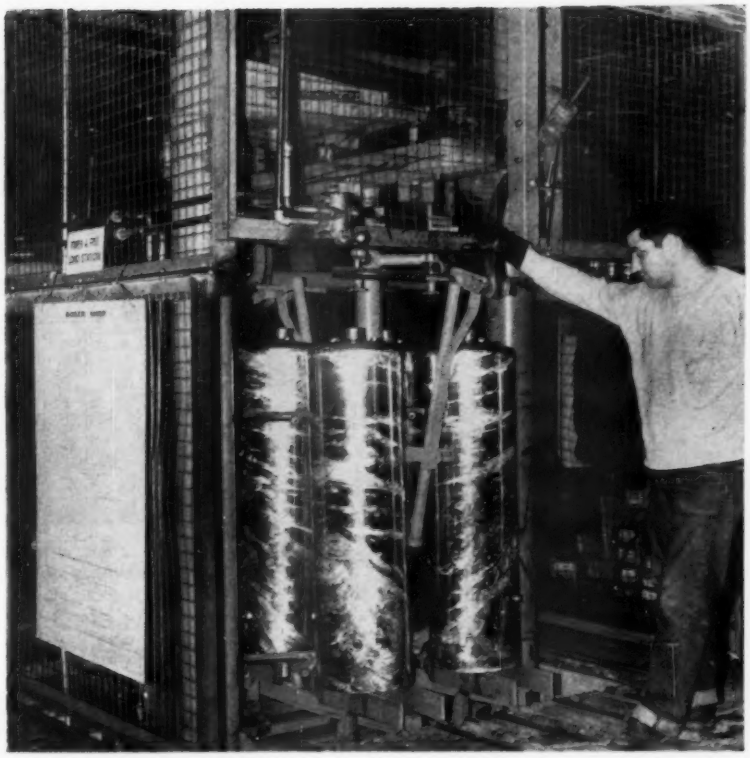
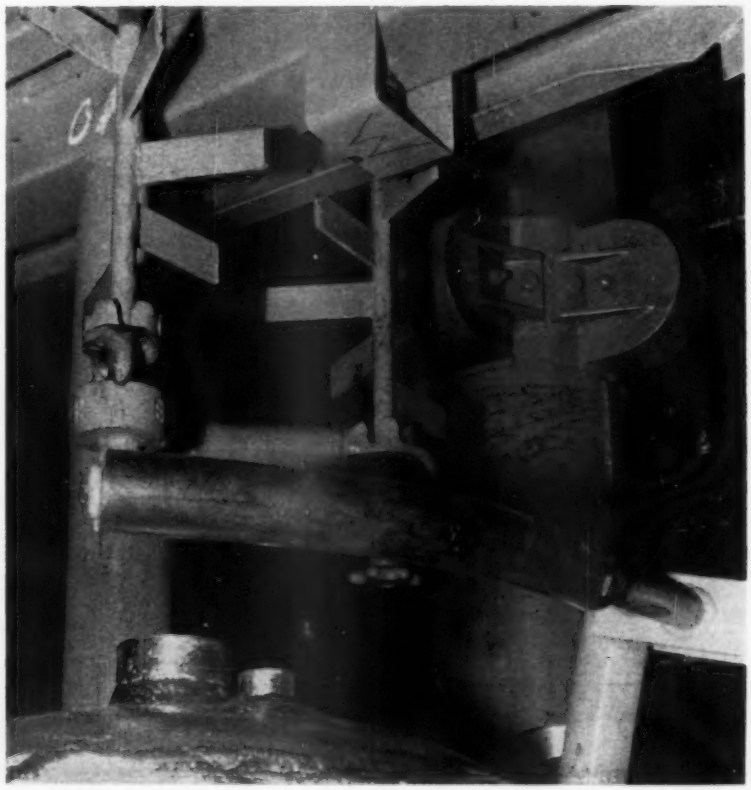


Fig. 3. Water heater tanks, loaded on the conveyor carrier, will be elevated to shunt conveyor, then switched to the powered section of conveyor for storage.

Fig. 4. Coded signal flags are mounted on conveyor carriers to denote type of tank in each individual load; the signals are reset when the carrier is unloaded.



Hon. Sidney Smith, Secretary of State for External Affairs, opens the convention. Seated, left to right are UPADI officials: Vance, Canada; De Brito, Brazil; Deschamps, Canada; Giannatasio, Uruguay; Medrano, Mexico; and Todd, U.S.A.

AIPE in First International Meeting

Past President Selected by EJC as a Delegate to Inter-American UPADI Conference in Montreal

FOR THE FIRST time since being elected to membership in the Engineers' Joint Council, the American Institute of Plant Engineers participated officially in an international conference of engineers. Dick Morris, Past-President of the AIPE was appointed by President S. A. Simonson to represent the AIPE on this occasion. He was later appointed as one of the ten voting delegates of the Engineers' Joint Council representing the United States at the Fifth UPADI Convention at Montreal in September.

The ten EJC voting delegates representing seven societies holding membership in the EJC were: AIPE; ASME; AIEE; ASEE; ASCE; AIME; and AICHE. The total registration at the meeting exceeded 150 and included delegates from fifteen countries.

Thirty-Three from USA

A total of thirty-three registered from the United States. Enoch R. Needles, President of the Engineers' Joint Council and Past-President of ASCE, was Chairman of the delegation from the U.S.A. The Vice Chairman of the Delegation was Gale Hathaway, Past-President of the ASCE and Chairman of the EJC's Committee on International Relations of which Gen. Stewart Reimel is Secretary. James A. Todd, Past-President of the ASME is President of the UPADI Fund Incorporated, a separate international organization set up to finance UPADI activities. The AIPE has contributed to the UPADI fund since its incorporation and is currently work-

At the final session Louis Giannatasio, UPADI president, presented a plaque to Kenneth Tupper, president of Engineering Institute of Canada (EIC), host to the convention.

ing to form chapters in Central and South America.

UPADI is an inter-American engineering organization, the initials standing for: Union Pan-Americana de Asociaciones de Ingenieros or, in the Anglicized version, the Pan American Federation of Engineering Societies. Membership in UPADI is not by individuals but by societies. Twenty leading countries of the Western Hemisphere are represented by one member each; an engineering organization which must truly be representative of the engineers of that country.

What Makes Up UPADI?

The United States is represented by the Engineers' Joint Council and Canada by the Engineering Institute of Canada. The latter arranged the meeting and was host for the Montreal Convention which was presided over by the EIC President, K. F. Tupper.

UPADI is relatively new, but it is the outgrowth of a similar one operating in South America for nearly two decades. The South American Association of Engineering Societies (USAI) originated the plan of broadening the organization to embrace the entire Western Hemisphere. The decision to establish UPADI was taken at the Rio de Janeiro Convention in 1949. The constitution was drawn up at the Havana Conference in 1951 and ratified at the New Orleans Convention in 1952. Subsequent Conventions were held in Sao Paulo in 1954 and Mexico City in 1956. The Montreal Convention was the fifth. Rio de Janeiro has been selected as the site of the sixth convention to be held in 1960.

Activities of UPADI are designed to bring the countries of the Western Hemisphere into closer understanding and may be grouped into seven general classifications. These include: 1, holding periodic conventions for the presentation of papers and the exchange of ideas; 2, facilitating professional contacts for engineers traveling in the Western Hemisphere; 3, encouraging the exchange of professors and students between the countries of North and South America; 4, supporting activities designed legitimately to enhance and benefit the engineering profession; 5, establishing high standards of professional conduct; 6, investigating and studying problems of economic and engineering importance affecting the member countries; and 7, the study and promotion of engineering industrial standards in the Western Hemisphere.

A group stops for a photo. Left to right: Villacreces, Ecuador; Diaz, Uruguay; Morris, USA; Ortega, Puerto Rico; and Villard, Haiti. Fifteen countries were represented.

Ortega, center, presents a Puerto Rican flag to Deschamps of the EIC. Left, Gooch, EIC and right, Font, Puerto Rico.

Engineering Education and Recognition

Many matters were dealt with during the sessions of the committee meetings. One of the major activities concerned engineering education, university development and organization, curricula, and financing. Another major concern of all countries was the matter of gaining recognition for engineers, and methods of increasing engineers' participation, particularly in major engineering projects requiring Government participation.

Standardization and the exchange of students and engineers between countries was also a matter of major concern and a good deal of the discussions dealt with means and methods of cooperating with other international organizations concerned with various phases of these problems.

Plans are being made by the organization of American States to select South American engineering school graduates in specialized subjects to come to the United States for a minimum of eighteen months for post-graduate studies in universities and for practical experience in plants. It is hoped that these students will return to their respective countries and form a cadre for the development of industrial centers, schools and research activities to promote specific industries in their own countries.

Several South American countries have set up what they call Centers of Productivity to act as consultants and advisers to industrial and agricultural development of the area. There seemed to be a general feeling that engineers at the present time were not taking sufficient interest, or playing an adequate role, in activities of this kind. **End**

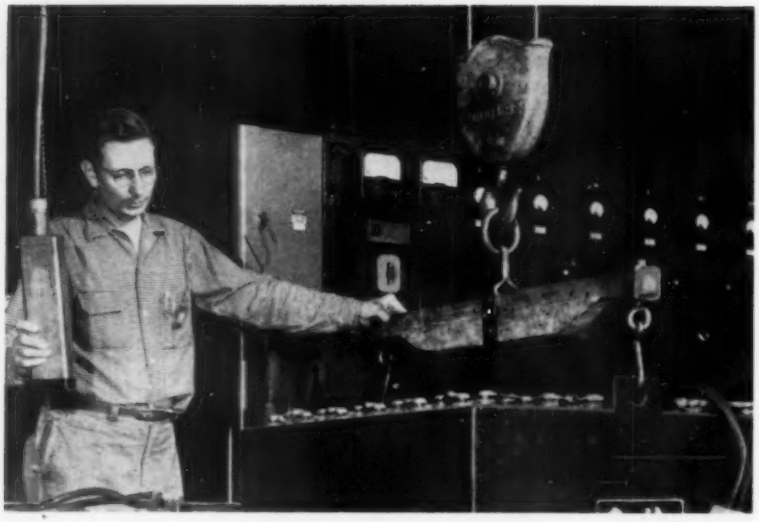


Fig. 1. Placing battery on special steel charging rack. Note wooden spreader bar designed so no angular strain is placed on battery tray.

BATTERY MAINTENANCE INSURES PRODUCT OUTPUT

By H. F. SULLIVAN, Plant Engineer, Caterpillar Tractor Co., York, Pa.

SYSTEMATIC storage battery maintenance on a program basis has helped Caterpillar Tractor Co. keep its fleet of electric trucks operating at peak efficiency, 24 hours a day, for the past five years, at its York, Pa., plant. The highly successful program could serve as a model for the rest of industry.

Pay-off is very real for Caterpillar, since smooth and continuous flow of materials at the 1,000,000-plus square foot York plant is largely dependent on the efficiency of its fleet of electric industrial rider and walkie trucks.

Caterpillar's battery maintenance program was instituted when the modern plant opened in 1953. Details were planned in advance in consultation with engineers from such firms as Exide Industrial Division of The Electric Storage Battery Company; The Electric Products Company, charging equipment manufacturer; and The Yale and Towne Mfg. Co., truck manufacturer.

Adequate space and equipment —centrally located in each of the two vast buildings and carefully laid out for efficient operations— were provided for battery charging, changing and maintenance.

At the end of each shift, all trucks are brought to the charging areas. Each operator disconnects the battery lead from his truck. If the truck is *not* to be used on the next shift, it is parked at the charging rack, and the battery is charged in the truck. If the truck *is* to be used on the next shift, the battery is removed from the compartment and placed on the charging rack by means of an overhead electric hoist.

Caterpillar uses a special spreader bar of its own design for lifting the batteries. See Fig. 1. The bar is wood, with steel fittings and hooks. The hooks are perpendicular to the top surface of the battery as they fit into the lifting holes. Thus, no angular strain is placed on the tray. Straight, narrow hooks are used so that they will not short on the battery straps or terminals.

Before batteries are charged, hydrometer and temperature readings of pilot cells are taken and recorded on a battery control card. Caterpillar takes readings of two pilot cells of each 36-volt battery and one pilot cell of each 12-volt battery. The battery maintenance man also checks water levels and adds water, if necessary, before beginning the charge. Additions of water are recorded.

Caterpillar uses an automatic taper-rate charging system. Charging is done by means of Electric Products motor-generator equipment and controlled by Exide TVR relays and Exide MP-2 charge control units.

During and at the end of charge, temperature and hydrometer readings of the pilot cells are taken and recorded. If a battery is scheduled for its periodic equalizing charge, it receives this immediately following the regular charge — to correct inequalities among the battery cells—is a continuation of the regular charge, at the finish rate, for three or four hours.

Each battery at Caterpillar is scheduled for an equalizing

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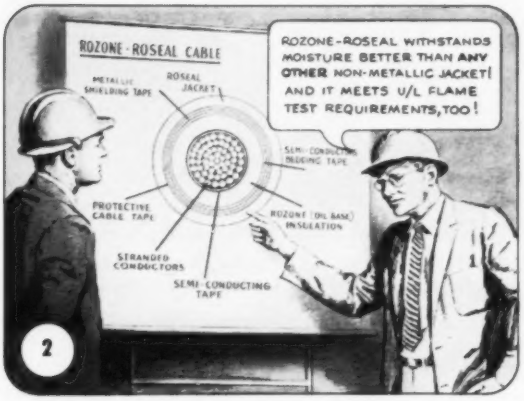

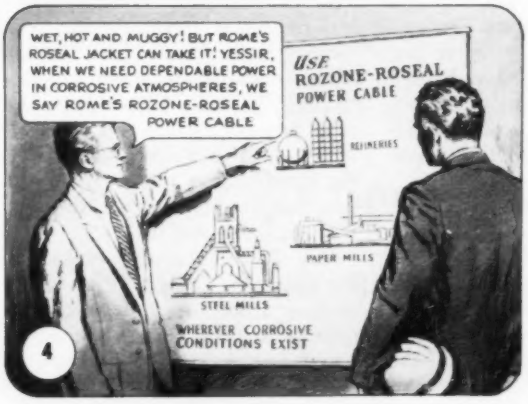
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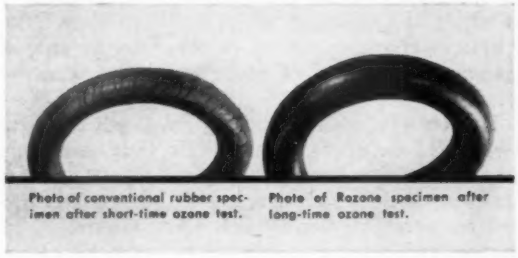

Photo of conventional rubber specimen after short-time ozone test. Photo of Rozone specimen after long-time ozone test.

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charge every two weeks. A special schedule insures that every battery at Caterpillar gets its equalizing charge regularly. Each battery has a number. Batteries with numbers ending in "1" get their equalizing charges on the first Monday, "2" batteries on Tuesday, "6" batteries on the second Monday and so on through "0" on the second Friday.

If a battery is not brought in on the scheduled day, a notation is made on the battery control record. The battery is traced and given the equalizing charge the next time it is brought in for its regular charge.

Once or twice a month, depending upon need, each battery is washed and cleaned to prevent an accumulation of dirt and corrosion. Done regularly, the washing process usually requires only the use of water. Occasionally, the batteries are cleaned with a solution of bicarbonate of soda (one pound to a gallon of water).

Every three months, voltage, hydrometer and temperature readings of all cells of each battery are taken and recorded.

Caterpillar uses two record forms — a battery control record (a temporary composite of operations in the charging area) and a battery charging record (a permanent card record of each battery).

The battery control record, an 8½ by 11-in. sheet, is used for original entry. Spaces are provided for battery number, gravity and temperature of pilot cell (on charge and during charge), the same information for the equalizing charge, number of vehicle into which the battery is installed, time installed.

Because all batteries and vehicles are numbered, the maintenance department knows at all times where a battery is being used. Knowing the department and to whom a vehicle is assigned, the maintenance department can —if, for example, an equalizing charge is omitted — call in the battery for servicing. Each maintenance man on the three shifts uses a different color of pencil, so the control record shows who serviced each battery.

The information of the battery control record is transferred to the 5 in. by 8 in. permanent charging record cards—one for each battery. Thus, Caterpillar has a complete history of each battery, showing calendar-and cycle-life.

These procedures have helped to keep Caterpillar's original batteries operating at peak capabilities since they were installed new in 1953.

Spacious open areas for charging and servicing—centrally located—are provided in both the manufacturing and warehousing buildings. Thus, the industrial trucks can reach the areas conveniently from all points of the buildings, and traffic in and out of the areas is uncongested.

The area in the manufacturing building is approximately 50 x 32 ft. A 4000-lb overhead tramrail hoist—with rails running lengthwise—spans the entire area. The hoist is used for all lifting within the area. This includes carrying a specially designed portable water tank, Fig. 2, used for adding water to the batteries on the charging racks and in trucks.

There is ample space for parking trucks while the batteries are on charge in the trucks. Also, there is rack space for twelve 36-volt batteries and twelve 12-volt batteries.

Fig. 2. Specially designed portable water tank, carried by overhead electric tramrail hoist, is used to add approved water to batteries before charging.

One-tier steel racks in the manufacturing buildings were specially designed for convenient battery handling. Parallel rails of the racks precisely fit the battery trays. Because there are no protruding dividers between the rails, careful spotting of the batteries is not required when placing them on the racks. Likewise, they can be moved along the racks without excessive lifting.

The 36-volt battery racks are designed to protect the cables leading from the charge control panels, to save on cable maintenance, to maintain neatness of the shop and to prevent accidents which could be caused by workmen tripping over loose cables. The cables from the control panels reach the racks by means of subfloor conduits. On the racks, the cables are attached to the undersides of the rails. Connectors mounted on the outsides of the rails make it convenient to connect the leads from the batteries.

Charging-service area of the warehousing building is approximately 60 by 40 ft. A 4000-lb overhead tramrail hoist spans the section where 36-volt batteries are serviced. A 2000-lb jib crane, swinging in a 180-deg arc, covers the 12-volt battery section. **End**

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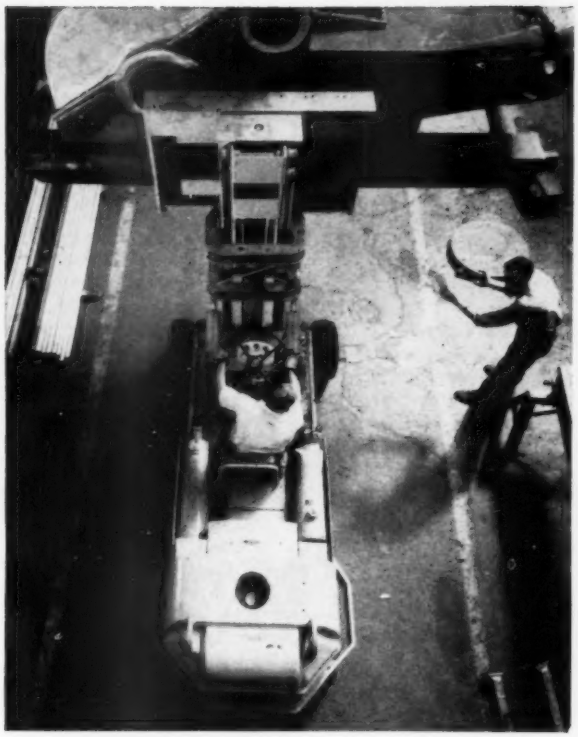

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Industrial-Type Control Panel Stands Guard Over Facilities in New Office Building

IN THE NEW GENERAL office building of Reynolds Metals Co., recently completed in Richmond, Virginia, building engineers have finger-tip control over heating and air conditioning. This supervision is achieved through a Supervisory DataCenter, developed by Minneapolis-Honeywell Regulator Co. The custom-built panel, first of its size to be built of aluminum, utilizes the principles of control and data recording used in industrial processing operations.

The panel, 32 ft long, permits one engineer to: 1. Continuously check and log temperatures and other data from all parts of the building; 2. Adjust remotely-located equipment and control devices; 3. Start and stop heating and air conditioning equipment; 4. Instantly make basic adjustments in temperatures in any area of the building; and 5. Supervise flow in the fire alarm sprinkler lines, providing instant warning of fire or failure in sprinkler equipment.

Schematic layouts of various equipment systems are shown on the portions of the panel governing those systems, with control instruments located in the appropriate part of the layout. A system of indicating lights shows when the various pieces of equipment are functioning properly.

The Supervisory DataCenter provides for efficient coordination of the complex mechanical functions of the heating and air conditioning systems. Without the center, it is estimated that the same supervision of the equipment would require an eight-man crew.

New Material and New Design Give Cooling Tower a New Look

AT ESSO STANDARD OIL COMPANY'S Baton Rouge, La., refinery, a new alkylation area cooling tower slants out from a base which is smaller than its top—a feature that contrasts with conventional design. It will provide additional water-cooling capacity for the stirred-reactor unit being built as part of an alkylation expansion program at the refinery.

Although it does not change the basic method of cooling, the new cross-flow tower is believed to be the first of this design built for industrial use. The exterior is of large asbestos cement louvers, which are widely spaced. These asbestos cement sections, being larger than panels generally used in tower construction, require a minimum number of joints and are easy to install.

The fan stacks at the top of the tower contribute to the design differences in the tower. Unusually tall, they extend 14 ft above the tower; like the tower, they are smaller at the base than at the outlet. According to Esso, their design results in lower requirements for horsepower to move air through the tower.

The Marley Co., Kansas City, designed the cooling tower, and is building it at the Louisiana refinery site.

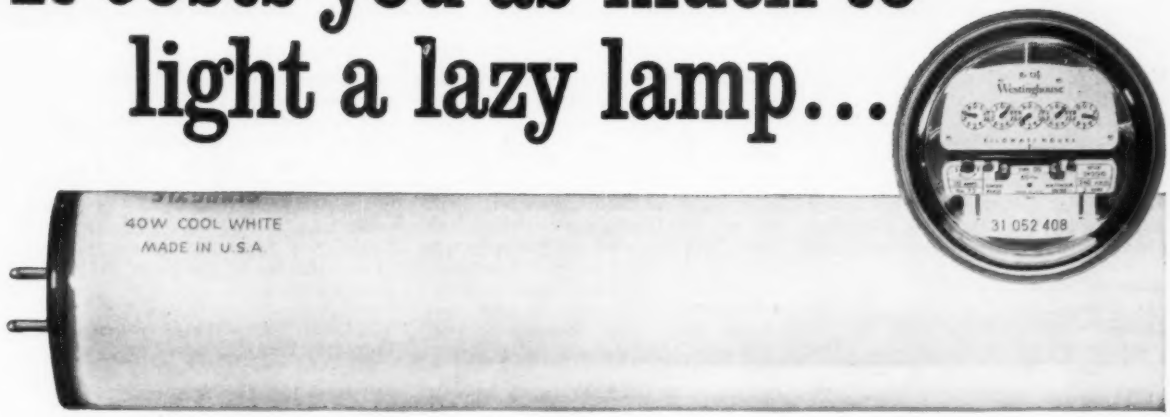
Conveyor Belt in Warehouse Speeds Delivery of Industrial Truck Parts

MORE THAN FOUR and one half million parts are stocked at the new seven-acre Central Parts Division warehouse that Clark Equipment Co. has opened on Chicago's south side. An IBM system tabulates, records, and remembers every vital fact about parts ordered.

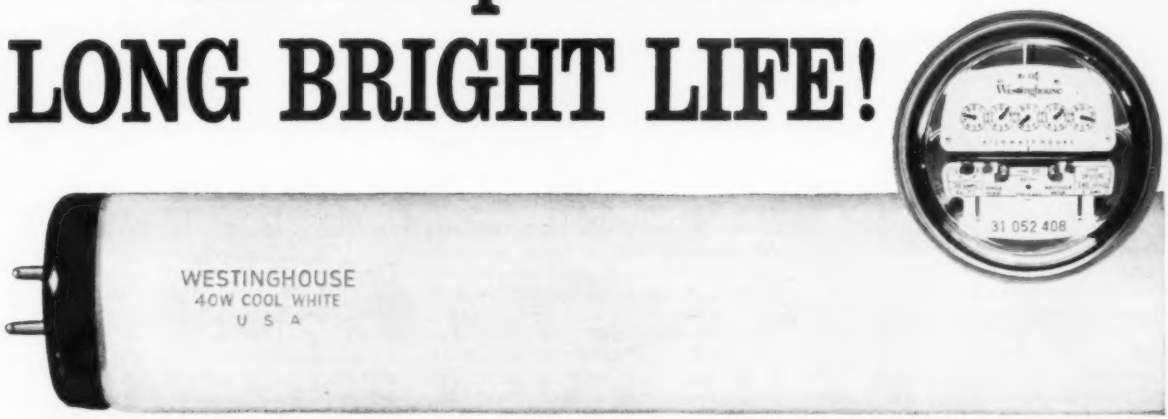
The warehouse is linked by a 13,000-mile network of private communications wires to nine Clark plants and sales offices and 95 dealers. In addition to covering the United States, the network includes a Clark plant and dealerships in Canada and the company's international headquarters in Havana.

A majority of the 60,000 to 70,000 different kinds of parts now under one roof in Chicago are for materials handling trucks. Orders are processed and filled by personnel using the latest automated and electronic equipment. Parts shipment is further expedited with the use of tractor-trailers, fork-lift trucks, powered hand trucks, a 468-ft long conveyor belt that extends through the storage area, a punched tape system and the IBM electronic calculator and accounting machines.

It costs you as much to light a lazy lamp...



as a Westinghouse with "Ultralume" phosphors ...the lamp with the LONG BRIGHT LIFE!



SOME FLUORESCENT LAMPS get "lazy" fast. They eat up the same amount of electricity, but grow dimmer fast. Only Westinghouse fluorescents stay bright as new . . . longer, because Westinghouse lamps have "Ultralume"™ phosphors!

"ULTRALUME" is an exclusive new Westinghouse phosphor that assures maximum brightness for the life of the lamp! "Ultralume" phosphors give you more light per foot of lamp, yet a Westinghouse costs no more to operate than any ordinary lamp.

ALL Westinghouse fluorescents have "Ultralume" phosphors . . . there's one for every business or home use. Specify Westinghouse on every lamp order. Call your local authorized Westinghouse agent or write—Westinghouse Lamp Division, Bloomfield, New Jersey.

Westinghouse (W) FLUORESCENT LAMPS

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NEW PLANT CONSTRUCTION —advance information on location, costs

Ketona, Ala.—Ketona Chemical Corp., plans to construct additional facilities at local plant to produce prilled ammonium nitrate and ammonium nitrate-limestone. Plant will have a capacity of 75 tons per day when completed next year. Design and construction contract has been let to Chemical & Industrial Corp., Cincinnati, O.

Alvarado, Calif.—Campbell Chain Co., 415 Norway St., York, Pa., plans to construct an industrial plant for the manufacture of chains, formed wire goods and other company products. Work is already under way on the new 175,000-sq ft facility expected to be in production by late 1959. Plant when completed by A. S. Holmes & Son, Inc., 9300 G St., San Francisco, Calif., will represent an investment of approximately $2 million, including plant equipment.

Whittier, Calif.—Eastman Kodak Co., 343 State St., Rochester, N. Y., is constructing a plant at Slauson Ave. and Byron Rd., this city. Plant will have a manufacturing area of approximately 125,000 sq ft. Work is already under way and plant is scheduled to be in operation by early 1960. Cost reported to be about $2 million.,

Clinton, Conn.—Chesebrough-Ponds, Inc., 485 Lexington Ave., New York, N. Y., plans to construct a one-story plant addition at company plant located here. New wing will be added to production building and will include installation of a boiler house, laboratory, warehouse and railroad dock. Project is scheduled to be completed by early 1960 at a reported cost of about $2.5 million.

New Milford, Conn.—Kimberly-Clark Corp., 4500 N. Commercial St., Neenah, Wis., has awarded a $3-million contract for major addition and expansion of paper making facilities here. Work on new addition will begin at once for scheduled completion by late 1960. W. J. Megin, Inc., 51 Elm St., Naugatuck, Conn., is the construction engineer.

Caldwell, Idaho—Kit Manufacturing Co., Inc., Long Beach, Calif., plans to construct a large plant here. New building, for the production of mobile homes and travel trailers, will be erected on a 10-acre site and is scheduled to produce at least 10 units daily. Plant is scheduled to go into production by 1959.

Franklin Park, Ill.—Motorola, Inc., 4501 W. Augusta Blvd., Chicago, Ill., plans to construct a research engineering center here. Plans call for the erection of a three-story building with a floor area of 74,000 sq ft, for research engineering and administrative purposes. Plant is scheduled for completion in 1959 at a cost estimated at $1.1 million.

Moline, Ill.—American Air Filter Co., Inc., 200 Central Ave., Louisville, Ky., plans major addition to company facilities at its Herman Nelson Division here. New concrete and steel structure will contain 76,800 sq ft of floor space and will increase plant capacity by approximately 50 per cent. A new crane will be installed in the expanded area, capable of handling up to 4500 tons of sheet steel annually. Addition will be completed by mid-1959 at a reported cost of $750,000.

View from end of main building of United States Steel's new blooming and structural mill at South Works in Chicago. Holes in floor are for the finishing rolls—soon to be installed.

North Judson, Ind.—Flintkote Co., Inc., 30 Rockefeller Plaza, New York, N. Y., plans to construct a large plant on a 30-acre tract of land recently acquired by the company. Plant will have a manufacturing area of 50,000 sq ft, and will cost in excess of $2 million when completed in late 1959. Rogers Engineering & Construction Co., Vincennes, Ind., is in charge of construction.

Dundee, Mich.—Dundee Cement Co., has broken ground for the construction of major cement operation here. Plant reported to cost $36 million will have a capacity of better than 18 million bags of cement annually and will go into production by January 1960.

St. Louis, Mo.—Chrysler Corp., 344 Massachusetts St., Detroit, Mich., plans to construct a large plant administration office on building site near here. New plant will be a two-story masonry, steel and concrete structure with a floor area of approximately 42,000 sq ft. Preliminary work is already under way on the structure with completion scheduled for early 1960. Work will be done under supervision of Fruin-Colnon Contracting Co., 1706 Olive St., St. Louis, Mo., at a cost reported to be about $1 million.

St. Louis, Mo.—Walsh Refractories Corp., 101 Ferry St., plans to construct a plant for the manufacture of fusion cast refractories. The one-story, brick, concrete and steel plant will have a floor area of 60,000 sq ft, and will be erected adjacent to present facilities of the company. Fruin-Colnon Contracting Co., has been awarded construction contract for project.

Warrenton, Mo.—Bickley Manufacturing Co., plans to construct major addition to company's plant located here. Plans call for an 84,000-sq ft addition to house roller die facilities for cold roll forming of metal parts and components used in the manufacture of truck bodies and other products. Work on the new addition is already under way for completion in early 1960. Cost reported to be about $850,000.

Phillipstown, N. Y.—Waverly Chemical Co., Mamaroneck, N. Y., plans to construct a 12-million pound per year chemicals plant. Work will begin at once and plant is scheduled to be in operation by mid-1959. Plant will produce surface-active agents, including emulsifiers, dispersants, penetrants and wetting agents for cosmetic, pharmaceutical and other industrial uses. Cost reported to be about $400,000.

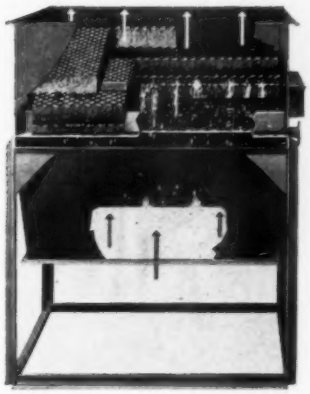
Crestline, O.—Pittsburgh Plate Glass Co., Glass Division, 632 Fort Duquesne Blvd., Pittsburgh, Pa., plans to construct a glass fabricating plant here for the production of tempered glass. Plant scheduled for completion late in 1959, will have a floor area of 275,000 sq ft. Cost reported to be about $2.5 million.

Northampton, O.—Alside, Inc., 1415 W. Waterloo St., Akron, O., plans to construct a plant for the manufacture of the company's products. New plant will be erected on 82-acre site and is scheduled for completion by 1960. It will cost $1.5 million.

Laverne, Okla.—Sun Oil Co., Petroleum Building, Tulsa, Okla., plans to construct a new casing-head gasoline plant on large site here. Facility will have the capacity to handle 100 million cu ft of wet gas per day. Work scheduled for completion by early 1960 will cost approximately $3 million.

(Continued on page 210)

This new unit stops destructive plant mists and vapors



This is the Type M Cycoil, newest product of AAF dust control research. It is a special dust collector designed to do a specific job: collect the mists and vapors that ruin automobile finishes, plant roofs and neighborhood home exteriors. It does its job well. It is higher in efficiency, lower in cost, lighter in weight and less space-consuming than conventional collectors used for this service. Bulletin 286 describes the Type M Cycoil in more detail.

AAF

American Air Filter

BETTER AIR IS OUR BUSINESS

Mr. Robert Moore
American Air Filter Company, Inc.
228 Central Avenue, Louisville, Ky.

Please send me Type M Cycoil Bulletin 286.

Name_____

Company_____

Address_____

City_____ State_____

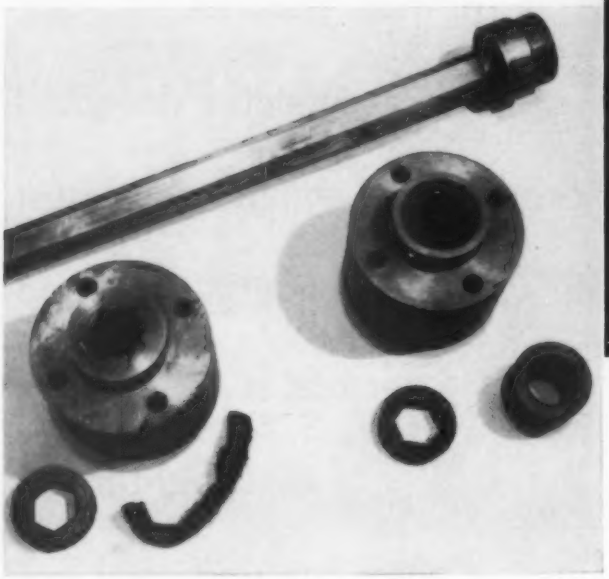
In Canada: American Air Filter of Canada, Ltd.,
400 Stinson Blvd., Montreal 9.

For more facts circle 568 on Reply Card

"Cast Urethane* parts that outwear steel cut maintenance costs 65% on this pneumatic hammer..."

says H. B. Minturn
Mechanical Superintendent
The Ormet Corporation†

Urethane elastomer components replaced machined steel parts in these pneumatic hammers; show no sign of wear after four months of punishing use, says Ormet's H. B. Minturn (right).



After comparable periods of service, superior wear resistance of cast urethane bushing (right) over machined steel shaft guide with lead graphite packing (left) is obvious. Resiliency of urethane inserts also reduces angular stress on shaft in operation.

"The replacement of steel inserts with cast urethane parts in our pneumatic sand ramming hammers has resulted in a two-thirds reduction in maintenance, with attendant savings in cost of spare parts," says Mr. H. B. Minturn of Ormet Reduction Plant, Hannibal, Ohio.

The steel nose pieces of the rammers, used to tamp a 12-ton mixture of calcine, anthracite coal and foundry coke which lines the cathodes of large electrolytic cells for producing pure aluminum, had a service life of only one to two months. Lead packings lasted less than half that long. "This meant we were losing 2½ hours of potential production time to maintenance every time one of these units had to be torn down to replace the worn parts," Mr. Minturn adds.

"Cast urethane parts have eliminated these problems. The urethane linings in the nose pieces and packing rings seem to be indestructible and show no signs of wear after four months of constant use. The use of urethane parts has given us an added advantage by enabling us to redesign the gasketing to include grease rings which further reduce wear on the shaft and other working parts.

"To sum up, we have really found a tough, friction-resistant material in this elastomer—one which is easily machinable, resilient and low in cost."

†The Ormet Corporation, jointly owned by Olin-Mathieson and Revere Copper and Brass, Inc., is typical of the basic industries that are finding urethane elastomer a ready-made answer to some of their toughest maintenance problems.

MOBAY
CHEMICAL COMPANY
Dept. PL-1 • Pittsburgh 34, Pa.

MOBAY
First in Urethane Chemistry

*The exceptional properties referred to in this application story are obtainable only in urethane elastomers made with Mobay's chemicals. Write to Mobay Chemical Company for technical details and sources of fabricating assistance.

For more facts circle 697 on Reply Card

NEW FROM HONEYWELL!

THE "COMPLETE SAFETY" PROTECTOGLO*

FIRST AND ONLY COMPLETELY FAIL-SAFE FLAME SAFEGUARD

Listed and approved by the Associated Factory Mutual Laboratories and by Underwriters' Laboratories.

The need for protection in gas burner operation has been long recognized . . . and the subject of intensive research.

In 1951, a Honeywell advancement provided a "self-checking" operation at the time of burner startup . . . and spurred the search for full-time protection, because flame-safeguard components can and do fail "unsafely."

Now Honeywell, first again, offers a self-checking circuit that *continuously* supervises all system components. Never before has there been such complete protection . . . *protection you can't afford to be without.* Write for Specification S1015-5.

MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa.

Honeywell

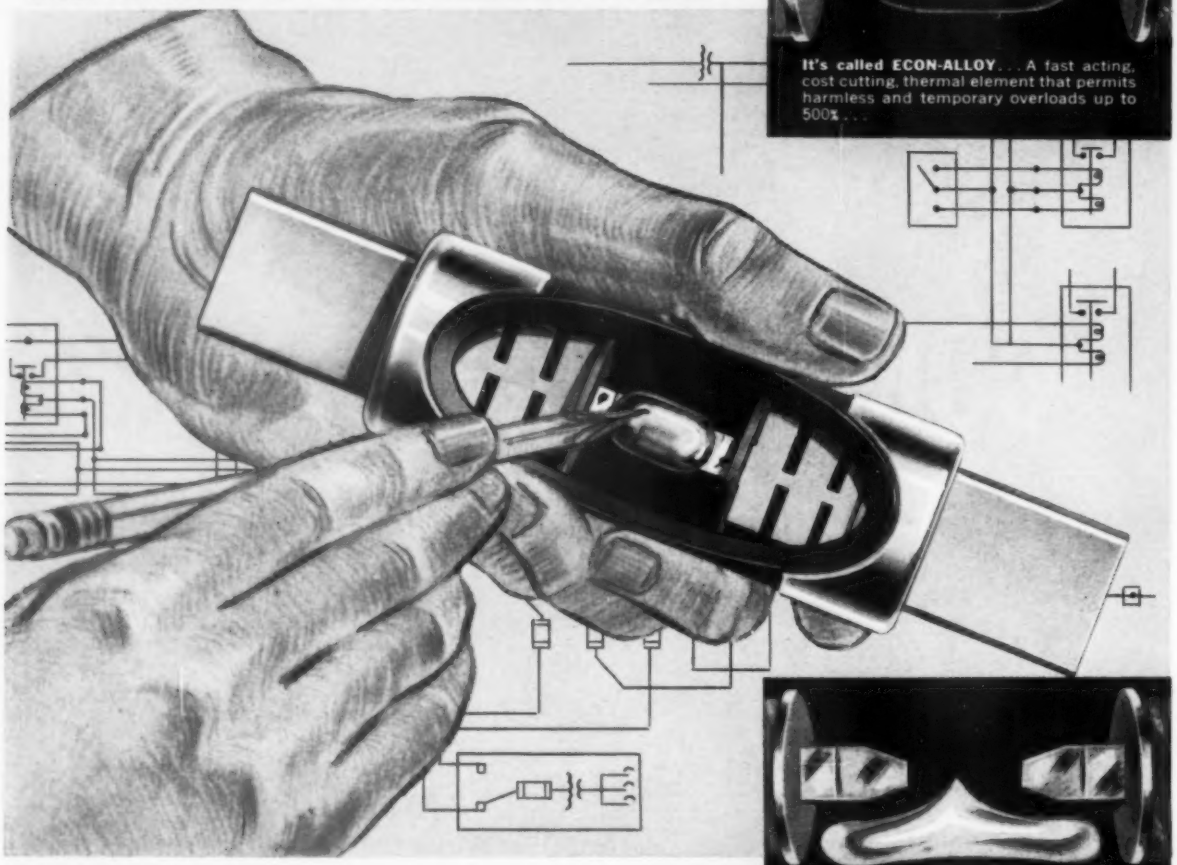
H HONEYWELL First in Control

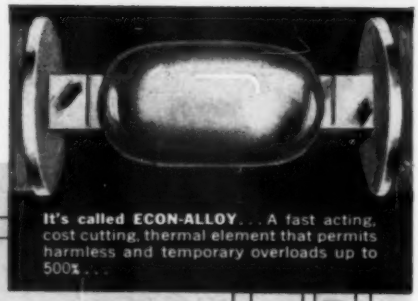
"'A significant technical advancement" . . . at the A.G.A. Convention, Parade of Gas Progress.

this is the exclusive ECON®

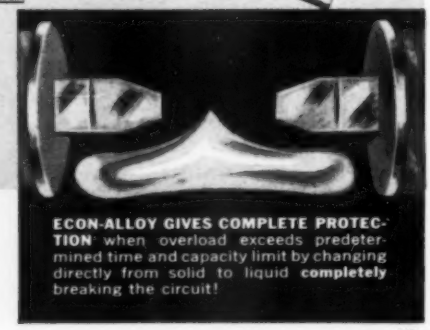
Super Safety Zone!

heart of the ECON® DUAL ELEMENT FUSE!





It's called ECON-ALLOY... A fast acting, cost cutting, thermal element that permits harmless and temporary overloads up to 500%...



ECON-ALLOY GIVES COMPLETE PROTECTION when overload exceeds predetermined time and capacity limit by changing directly from solid to liquid **completely** breaking the circuit!

515

Why risk costly work stoppages due to temporary or harmless overloads when you can have the *complete protection* of ECON® Dual Element Cartridge Fuses . . . *Econ-Alloy Thermal element* (The heart of the Super Safety Zone) permits overloads up to a predetermined time and capacity limit then *gives complete protection! Fusible Links* joined to the Econ-Alloy thermal element give instant *protection on short circuits!* Next time you buy, *specify* ECON® Dual Element Cartridge Fuses — for *complete protection!*

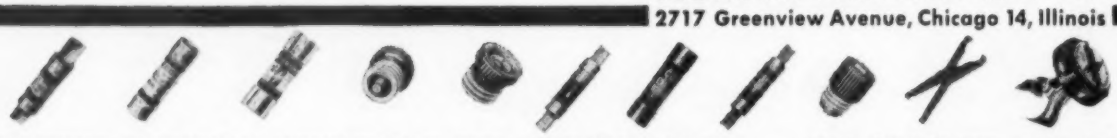
Available in Knife Blade or Ferrule type from 0 to 600 amperes, 250 and 600 volts. Underwriters' Laboratories listed.

Write for ECON® Dual Element Catalog S-60.

it's always extra economy to call for

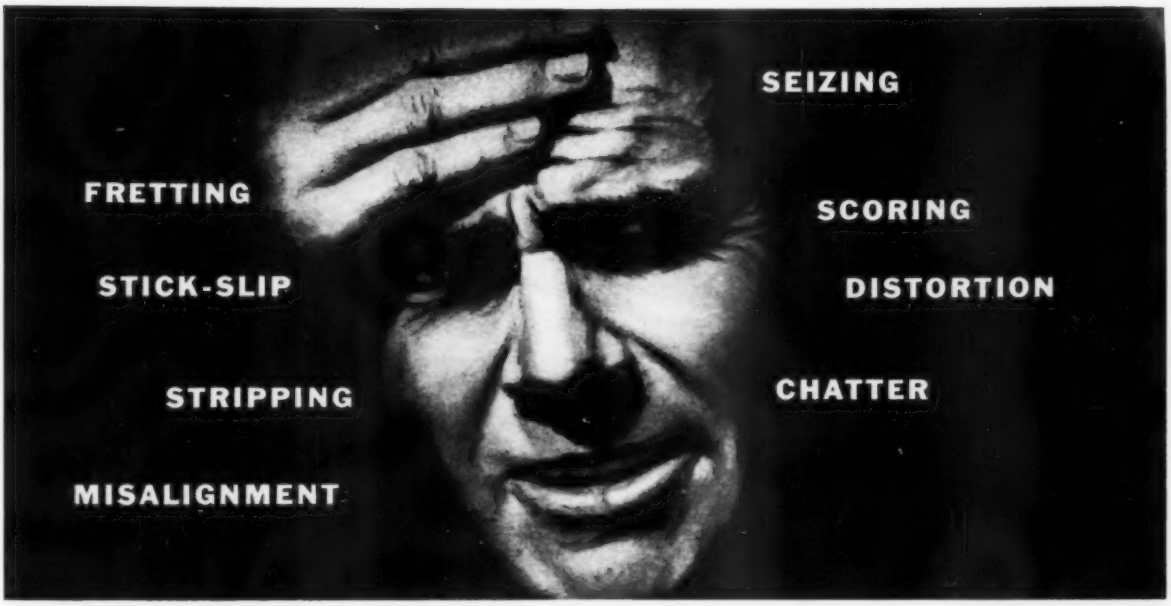
ECONOMY FUSES

ECONOMY FUSE AND MFG. CO.
2717 Greenview Avenue, Chicago 14, Illinois



ASK YOUR ELECTRICAL WHOLESALER FOR ECONOMY FUSES . . . THE COMPLETE FUSE LINE

For more facts circle 570 on Reply Card



WHICH LUBE HEADACHE IS YOURS?

Molysulfide® T.M. Grease can cure it in minutes

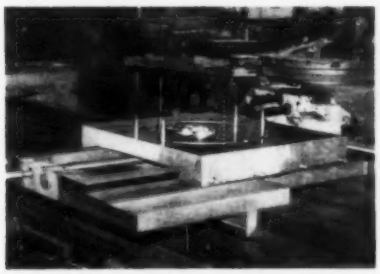
How is it possible? . . . Simply wipe a thin coating of Molysulfide grease—or Molysulfide concentrate—on the surfaces to be lubricated. The Molysulfide quickly forms a high strength layered film that prevents metal to metal contact, and lubricates even under severe load conditions . . . where conventional lubricants are wiped off or forced entirely out of the critical area.

Four main properties of Molysulfide explain why it is so effective: (1) It is as slippery as ice. (2) Resists excessive pressures. (3) Lubricates over a wide temperature range —275°F to 850°F. (4) Sticks "like glue" to metal.

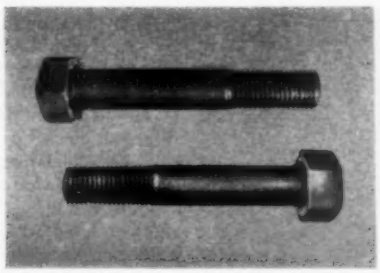
No other known substance equals Molysulfide heavy-duty lubricant as an immediate cure for galling and seizing of threaded connections . . . scoring and distortion of press fits . . . stick-slip or chatter on machine ways . . . fretting on splines . . . or for similar troubles involving gears, cams, collets and chucks.

Which lube headache can it solve for you? You can discover in virtually a single application.

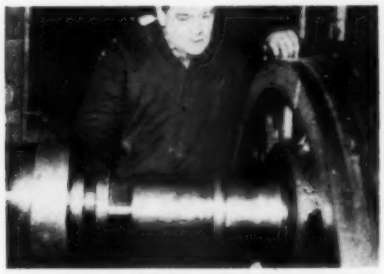
Order a pound of Molysulfide, in either powder or concentrated grease form, from any one of the manufacturers below.



No slip-stick action at low speeds on machine tools gibs and ways when they're greased occasionally with Molysulfide heavy-duty lubricant.



No seizing. Service dismantling of powerhouse generator reveals bolts in top condition 21 months after Molysulfide lubrication.



Press fitting without galling. Both assembly and disassembly of locomotive drive journal go smoothly when Molysulfide lubricant is used.

CLIMAX MOLYBDENUM

Heavy-duty lubricants containing Molysulfide are now available nationally. Order from any of these well-known manufacturers:

Acheson Colloids Co., Port Huron, Michigan • The Alpha Molykote Corp., 15 Harvard Ave., Stamford, Connecticut • Basco, Inc., 730 W. Jackson St., P.O. Box 461, Milwaukee 1, Wisconsin • Bel-Ray Co., Green Village Rd., Madison, New Jersey • Bemol, Inc., 131 State St., Boston 9, Massachusetts • Fiske Bros. Refining Co., 1500 Oakdale Ave., Toledo, Ohio • Jet Lube, Inc., 3093 N. California St., Burbank, California • McGee Chemical Co., 8000 West Chester Pike, Upper Darby, Pennsylvania

For more facts circle 571 on Reply Card

INTERLOCKED ARMORED CABLE

For Power Distribution in New Plants or in Modernizing Old Plants For more current capacity than cable in conduit or other armored cable, *specify and buy Rockbestos A.V.C.* . . . for easy installation on racks or hangers beneath the ceiling or next to walls, *specify and buy Rockbestos A.V.C.* . . .

. . . To eliminate costly conduits and ducts . . . to save important dollars on materials and installation time, to permit quick, easy repairs, *specify and buy Rockbestos A.V.C.* . . . All interlocked armored cables are not alike . . . and, for maximum dollar-savings and maximum performance be sure to *specify and buy Rockbestos A.V.C.* Interlocked Armored Cable — the superior AVA Cable.

Write now for the new Rockbestos manual which gives the application and design data to help you *specify and buy Rockbestos A.V.C.*

ROCKBESTOS PRODUCTS CORPORATION, NEW HAVEN 4, CONNECTICUT

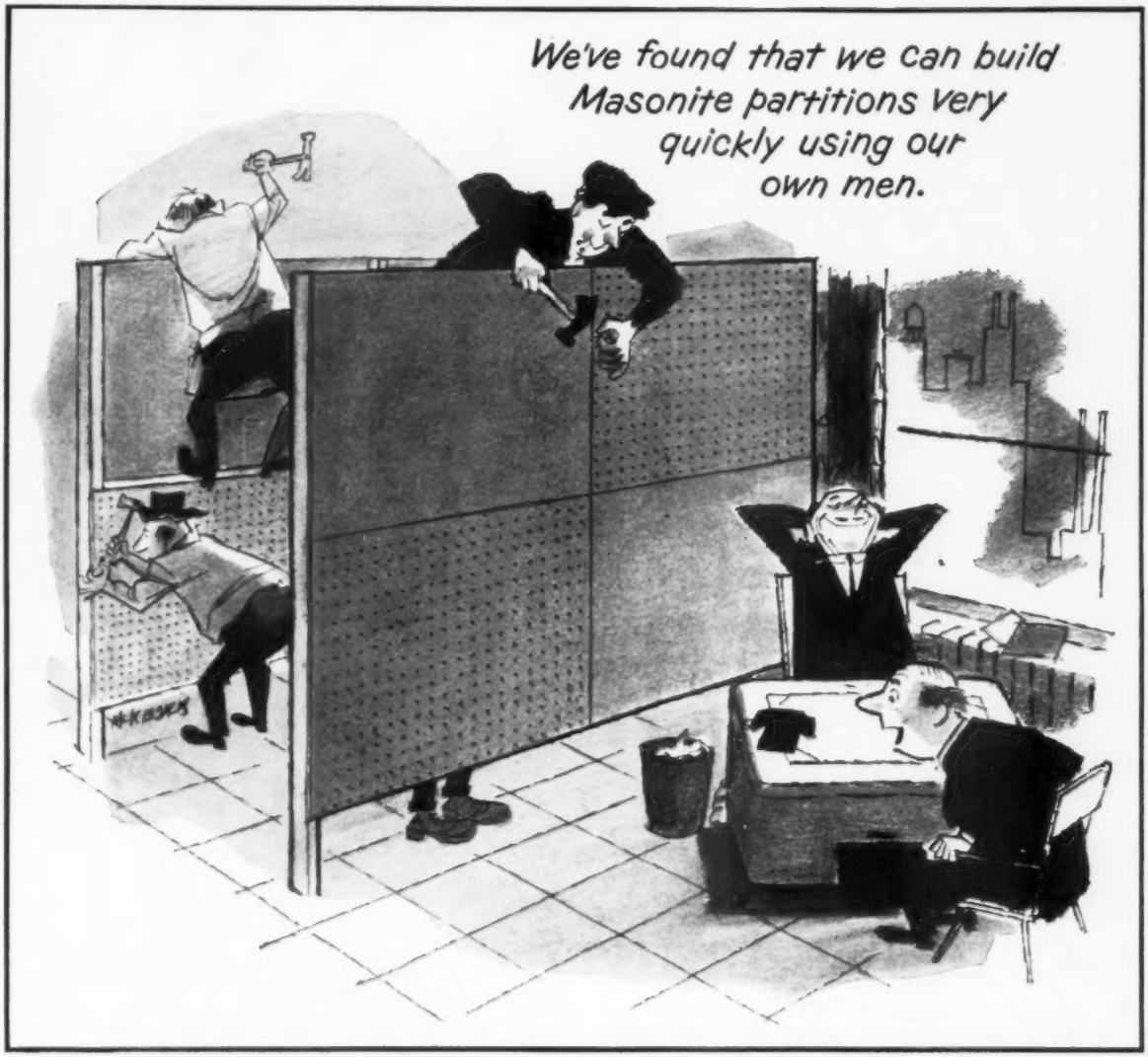
NEW YORK • CLEVELAND • DETROIT • CHICAGO • PITTSBURGH • ST. LOUIS
ATLANTA • DALLAS • SEATTLE • LOS ANGELES • BURLINGAME, CALIFORNIA

ROCKBESTOS A.V.C.

THE SUPERIOR A.V.A. CABLE

For more facts circle 572 on Reply Card

MASONITE
Makes the News



®Masonite Corporation—manufacturer of quality panel products.

Now! Build low-cost partitions from a variety of Masonite® panels

It costs so little to build attractive, durable partitions with Masonite's smooth-surfaced panels.

And it costs so little more to add a touch of the unusual with Masonite's textured-surface panels. Choose among a vertical groove design (Panelgroove®), a striated pattern (Ridgeline®), a striking wood-grain texture (Seadrift), perforated hardboard (Peg-Board®), or even a leather-like texture (Leatherwood®).

All are easy to fabricate; all can be painted or enameled quickly, handsomely—and all are available from your local lumber dealer.

MASONITE®
Panel Products

MASONITE CORPORATION
Dept. PE-11, Box 777, Chicago 90, Ill.

Please send me your booklet showing how to improve factory methods with Masonite panels.

Name .....

Firm .....

Address .....

City ..... *State* .....

Zone ..... *County* .....

For more facts circle 573 on Reply Card

DAY-BRITE CFI-10® (Comfort For Industry) fixtures, mounted 22 feet above the floor, furnish up to 40 foot-candles in this warehouse area at the GENERAL ELECTRIC APPLIANCE CO., Grand Rapids, Mich. HARLEY, ELLINGTON & DAY, Detroit, *Architects;* CLEMENT ELECTRIC CO., Grand Rapids, *Electrical Contractor.*

DAY-BRITE LIGHTING pays off for General Electric in these 3 ways

1. *In installation!* Day-Brite equipment is designed, factory pre-assembled and packaged to save hanging and wiring time on the job.
2. *In maintenance!* The cost of upkeep goes down with easy-to-relamp, easy-to-clean Day-Brite fixtures.
3. *In comfort lighting!* Nothing boosts worker efficiency and morale like Day-Brite lighting.

For information on how Day-Brite lighting can pay off for *you*, call your Day-Brite representative listed in the Yellow Pages.

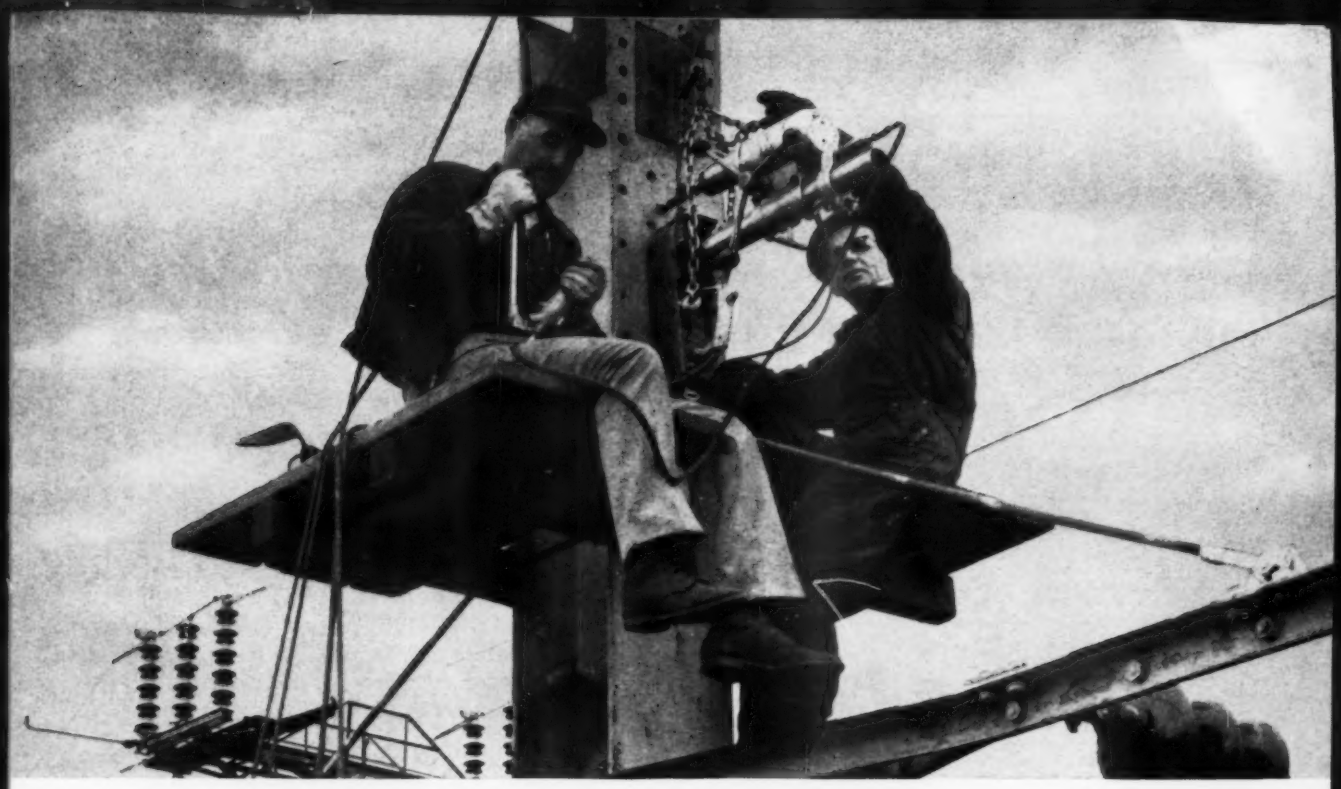
DECIDEDLY BETTER
DAY-BRITE
LIGHTING FIXTURES

Day-Brite Lighting, Inc., 6242 N. Broadway, St. Louis 15, Mo.
Day-Brite Lighting, Inc., of Calif., 530 Martin Ave., Santa Clara, Calif.

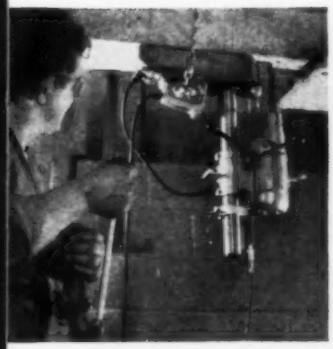
Z 439 © Day Brite Lighting, Inc. 1958

NATION'S LARGEST MANUFACTURER OF COMMERCIAL AND INDUSTRIAL LIGHTING EQUIPMENT

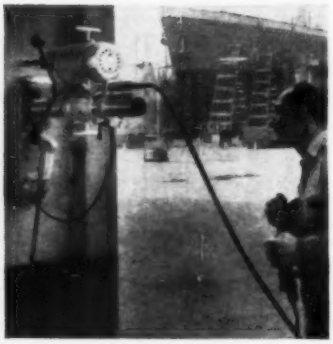
For more facts circle 574 on Reply Card



Job hard-to-reach, hard-to-handle?
Send for a B&D Magnetic Drill Press!

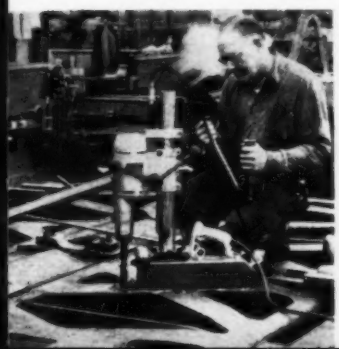


B&D 1¼" MAGNETIC DRILL PRESS works high overhead upside down; enables maintenance man to get into tight spots easily, rapidly.

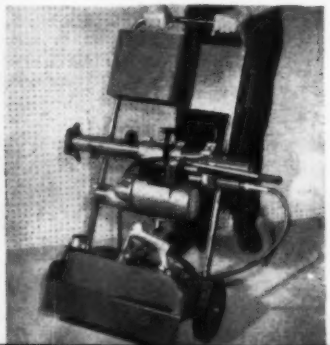


TAKE 'EM ANYWHERE you need a drill press. Both are light weight, easily transported, simple to put to work; move to the next job.

B&D 1¼" MAGNETIC DRILL PRESS works upright on huge Air Chuck drilling and tapping; ready for instant moving to next operation.



B&D CADDY CART is the perfect way to transport your Magnetic Drill Press from job to job. Prevents damage to this peak precision tool.



Save hours . . . even days on every job . . . one use may pay for the tool!

Whether your job is production, construction or maintenance, a Black & Decker Magnetic Drill Press sticks like glue to the job. Lets you stand off and guide the bit from a distance. And it takes just finger-pressure to drill even a 1¼" hole with Black & Decker's exclusive Hydra-power Feed.

See one on your work. Two sizes to choose from: ¾" and 1¼"; both complete precision units—not attachments. Perfect for drilling, reaming, tapping in tool shops, steel fabricating, maintenance—anywhere you need a drill press but can't take the work to the tool.

Leading Distributors Everywhere Sell

Black & Decker®

Quality Electric Tools . . . Power-built for top performance

THE BLACK & DECKER MFG. CO.
Dept. 0811, Towson 4, Maryland

- ☐ Please arrange a demonstration of your ☐ 1¼"; ☐ ¾" Magnetic Drill Press
- ☐ Send me additional information
- ☐ Send me information on the tools checked below.

Name..... Title.....

Company.....

Address.....

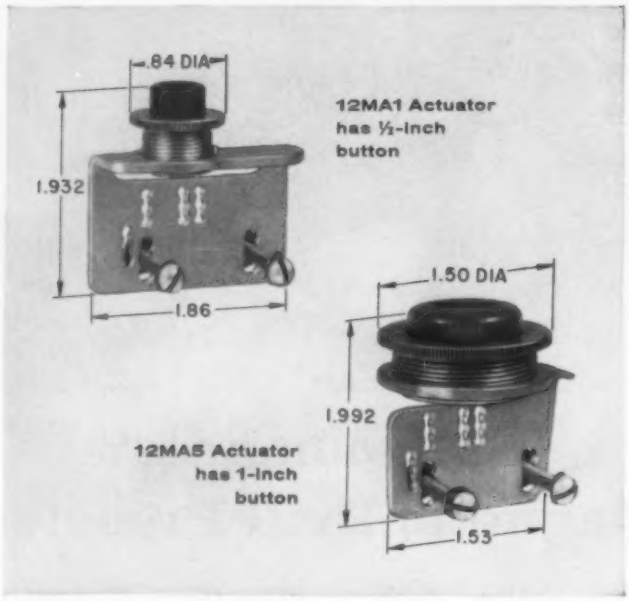
City..... Zone..... State.....

☐ Impact Wrenches ☐ Hammers ☐ Belt Sanders ☐ Drills

For more facts circle 575 on Reply Card

MICRO SWITCH Precision Switches

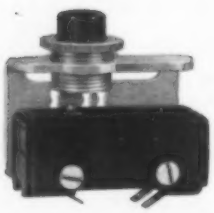
New Pushbutton Actuators accommodate all three types of basic pin plunger switches



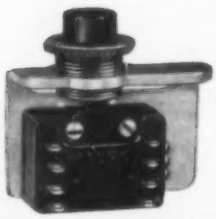
Provide low cost manual operation and excellent panel appearance

The new 12MA Actuators accommodate all types of standard pin plunger basic switches with mounting holes on 1-inch centers . . . specifically the "A" or "Z" basics, the "1TB" series and the "41TB" series. Because of this, the actuators may be used with an extremely wide selection of circuit arrangements, operating characteristics, terminals, and so on.

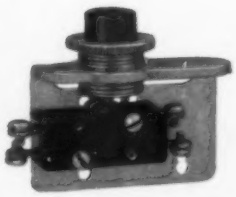
The actuators are neat and attractive when installed, with plastic buttons in a choice of red, green or black, and with clear anodized aluminum mounting bushings. The switch-mounting holes and the actuator-mounting holes are arranged to permit the use of panels from .060" to .312" thick. This also makes it easy to adjust the operating point of the switch assembly.



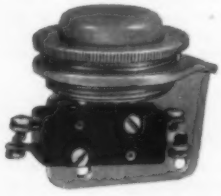
12MA1 (top) and 12MA5 actuators with "standard" pin plunger basic switch available in hundreds of variations.



12MA1 and 12MA5 actuators with a Series "41TB" basic switch which provides simultaneous control of four isolated circuits.



12MA1 and 12MA5 actuators with a Series "1TB" basic switch . . . most often used for controlling two isolated circuits.



For information about the 12MA actuators, ask for data sheet 155. For information on basic switches, write for Catalog 62.
Or contact the nearest MICRO SWITCH Branch Office. Look in the yellow pages.

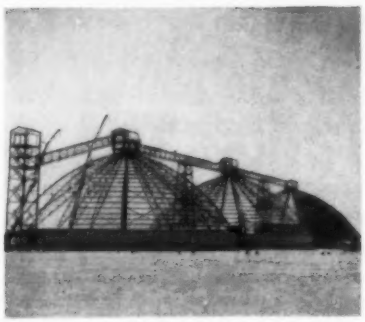
MICRO SWITCH . . . FREEPORT, ILLINOIS
A division of Honeywell
In Canada, Honeywell Controls, Ltd., Toronto 17, Ontario

Honeywell
MICRO SWITCH PRECISION SWITCHES

For more facts circle 576 on Reply Card

Steel Spiderweb

fabricated and erected by American Bridge



This project consists of 3 muriate storage buildings, 1 horizontal gallery, 2 intermediate support towers for horizontal gallery, 1 included conveyor gallery, and 1 junction tower.

This dome-shaped steel framework is part of a new product storage and reclaiming area recently built for the National Potash Company at Carlsbad, New Mexico. American Bridge, which fabricated and erected the entire structural framework for this important construction, used 505 tons of structural steel. Field connections were riveted, welded or bolted with high strength and ordinary bolts.

Each of the muriate storage domes is 185 feet across at the base. From the top of the foundation wall to the top of each dome is 69 feet. The foundation wall is 16 feet high. The crown ring which provides top anchorage for arched trusses is 83′ 8½″ above the finished floor of the building. There are sixteen panels in the roof structure of each building.

American Bridge has the experience, facilities and manpower to handle all types of structural steel jobs—conventional or complicated. Whatever your next building project, call American Bridge. Put our knowledge in structural steel construction to work for you.

Owner: National Potash Company

Designed by: Stearns-Roger Mfg. Co., Denver, Colorado and American Bridge Division

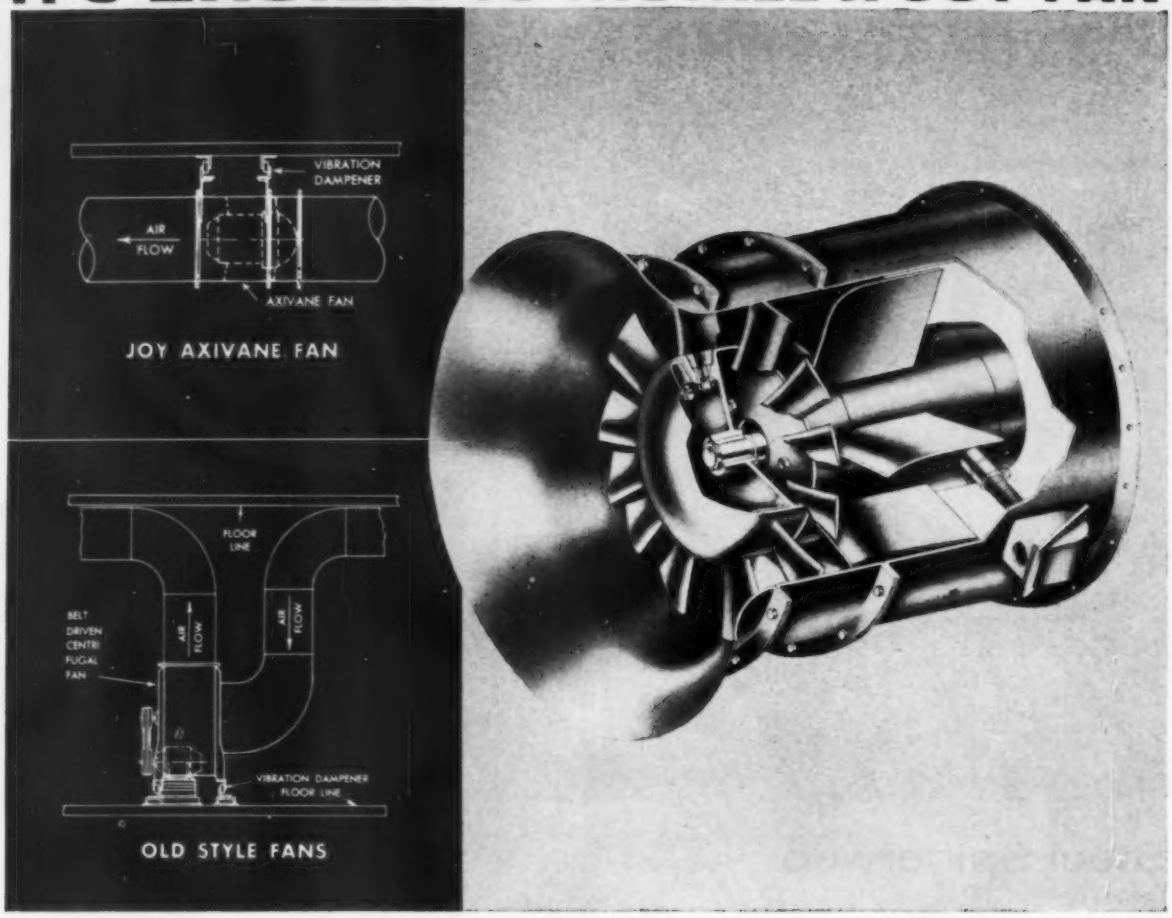
USS is a registered trademark

American Bridge Division of USS United States Steel

General Offices: 525 William Penn Place, Pittsburgh, Pa. Contracting Offices in: Ambridge · Atlanta · Baltimore · Birmingham · Boston · Chicago · Cincinnati · Cleveland · Dallas · Denver · Detroit · Elmira · Gary · Houston · Los Angeles · Memphis · Minneapolis · New York · Orange, Texas · Philadelphia · Pittsburgh · Portland, Ore. · Roanoke · St. Louis · San Francisco · Trenton · United States Steel Export Company, New York

For more facts circle 577 on Reply Card

IT'S EASIER TO INSTALL A JOY FAN



JOY FANS SAVE SPACE

simplify engineering and installation

When you install a Joy fan you install a simpler system of ventilation. The Joy fan offers high performance in a compact package. The fan fits right into the duct . . . and the motor is inside the fan.

Saves cost because the installation can be made during the fabrication of the duct system. **Saves cost** because the installation can be made by relatively unskilled labor. **Saves cost** because the duct system is simpler . . . no offsets or elbows.

Saves cost because it turns valuable space over for rental or use (value averaging $5.00 per sq. ft. per month).

Study the drawings above. Notice the efficiency and compactness of the Joy fan compared to other systems . . . then call in a Joy engineer. ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

WSW I 6878-199

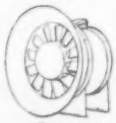
WRITE FOR FREE BULLETIN 199-18

JOY... EQUIPMENT FOR INDUSTRIAL PLANTS... FOR ALL INDUSTRY

Industrial Compressors

Conveyors

Electrical Connectors


Fans and Blowers

For more facts circle 696 on Reply Card

FOUR REASONS WHY

PLANT CONSTRUCTION IS GOING ALUMINUM

Save construction money now and maintenance costs later with these Alcoa® Aluminum Industrial Building Products and Materials . . . for both new plants and plant expansion:

1. Humid atmospheres and industrial fumes mean nothing to Alcoa Corrugated Roofing and Siding. Once up, that's it! No painting or expensive maintenance of any kind ever needed.

2. Aluminum-clad buildings can be *strong buildings* with Alcoa V-Beam Roofing and Siding. Safely carries 30 lb/-sq-ft uniform load on a 10-ft purlin spacing.

3. Aluminum-clad buildings can be *good-looking buildings* with Alcoa Ribbed Siding. This configuration makes buildings clean-lined with good vertical shadows.

4. Sandwich wall of Alcoa Aluminum is the lowest cost insulated metal wall system known: With a "U" value of .155, it has three times the insulating value of 8-in. brick. Goes up fast, too. Permits economical air conditioning.

All of these materials offer the benefits inherent in aluminum—corrosion resistance, low cost and good looks. They are sold and erected by Alcoa Approved Applicators. For the name of the Applicator near you, contact your Alcoa sales office, or write: Aluminum Company of America, 858-L Alcoa Building, Pittsburgh 19, Pennsylvania.

ALCOA ALUMINUM
INDUSTRIAL BUILDING PRODUCTS
ALUMINUM COMPANY OF AMERICA

Your Guide to the Best in Aluminum Value

ALCOA THEATRE
Fine Entertainment
Alternate Monday Evenings

For more facts circle 578 on Reply Card

NEW PRODUCTS AND PROCESSES summarized for your convenience

Edited by M. E. Heniken

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 219-220.

1—MACHINE TOOL KITS solve layout problems

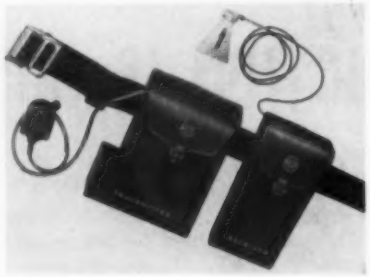
These assemble-it-yourself machine tool kits are offered for more economical three-dimensional plant layout work. Plant personnel can

do the final assembly and painting, saving as much as 50 per cent of the out-of-pocket costs usually involved in three-dimensional models, it is noted. The kits include planing mills, lathes, milling machines, drilling and sawing machines, sheet metal machines, office equipment — all scaled to size. Such extra parts as pipe, motors, etc., are also available. Scott Industries Inc.

2—BELT RADIO provides two-way communication

This little transistorized receiver and companion transmitter, the Personalfone 2-Way Belt Radio, can be integrated into standard FM radio systems in the 50 and 150 megacycle bands, or may be used as a separate radio system to provide personalized two-way voice communication. The self-contained units operate independently, providing the added flexibility of one- or two-way operation. Receiver and transmitter come in separate leather cases which can be clipped to a belt.

Light weight is a feature. The miniature transmitter weighs only 28 oz, including microphone, antenna, battery pack (providing more than 2000 average transmissions), and case. The compact receiver weighs only 14 oz, including lapel speaker, antenna, dry battery, and



case. The set is powered by a single battery and features complete transistorization and an optional battery saving device which extends battery life to 150 hr or more. The top of the set contains a fingertip operated combination on-off switch and squelch control. Optional accessories available include a rechargeable battery, web carrying belt and safety helmet equipped with built-in speaker. Radio Corp. of America.

3—CLAMP secures armored cable in ladder supports

This cable clamp, designed to secure armored cable in ladder cable supports, comes in both galvanized steel and aluminum, and fits cable from ¾ in. up to 8½ in. diam. The clamp may also be used to secure several small cables together. Rungs of company's cable ladder are slotted to receive the cable clamp; it is secured by a bolt. The clamps also serve to keep cables segregated. T. J. Cope Div., Rome Cable Corp.

4—CONDENSER combines air-cooling, water-cooling

Basic function of the BCW Unit is to operate as a normal air cooled condenser up to a selected ambient temperature, and to have its condenser capacity supplemented by the use of water above this temperature. Also, the water side condensing surface is designed to handle the complete condensing load in event of failure of air cooled system. Design makes it possible to retain advantages of an air cooled condenser, company says, and to utilize smaller size condensers. Design operating head pressures are maintained under ambient conditions, and a secondary system, capable of handling the complete condensing load in event of condenser fan motor or belt failure, is provided. Dunham-Bush, Inc.

5—ACOUSTICAL CEILING is good looking, washable

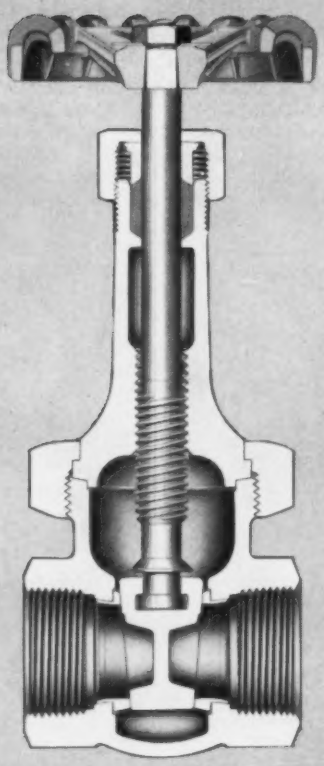
Available in 2-by-2 ft and 2-by-4 ft sizes, Supracoustic Panels come with a smooth, white lace-like finish giving an overall ceiling effect of a soft textural motif when installed. Special paint is claimed to make it possible to renew clean whiteness of original finish of this ceiling tile by washing. Panels are designed for installation on company's "T & T" suspension systems. Their pattern is attributed to new developments in long, textile-type spun glass fibers. The combination of this fiber structure and elasticized finish paint is said to give these panels strength and resiliency. The Celotex Corp.

6—PACKAGED DRIVES with a-c and d-c advantages

These packaged motor-generator type adjustable voltage drives are announced as combining the convenience and economy of a-c power with versatility of d-c power. They are furnished with standard speed ranges up to 8 to 1 by armature voltage control. Additional speed ranges by armature voltage control and by motor field control are available. Use of transistors, combined with magnetic amplifiers and metallic rectifiers are said to make these drives highly reliable. They come in ratings from 3 to 200 hp for single or multi-motor applications. Further details on the drives are in Bulletin SM-280. Square D Co.

7—PAINT SPRAY SYSTEM is portable and airless

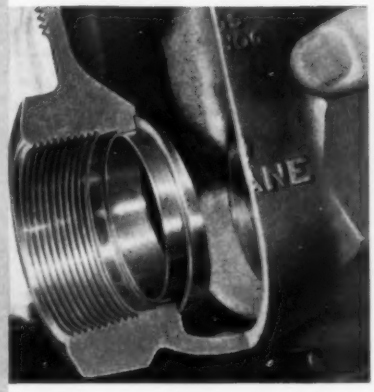
Based on mechanical atomization, Chieftain HydraAirless requires that viscosity-controlled paints be forced through a specially designed orifice at high pressure. Desired atomization is achieved through control of viscosity, orifice and pressure. No atomizing air is used.



COMPLETELY NEW—loaded with improved service features inside and out. Two complete lines: rising stem pattern (No. 634E—cross section shown), non-rising stem (No. 636E)—both in sizes ¼ to 3 in. incl., with screwed ends. See below for literature.

NEW CYLINDRICAL BODY SHAPE—a proven design on high-pressure steel valves—increases strength without added bulk, distributes pressure load uniformly, resists distortion and leakage at seats.

NEW, STRONGER HEX ENDS, better integrated with body, eliminate sharp contours, give entire valve more rigidity under line strains. Wider hex faces allow firmer wrench grip for easier installation. Marring less likely.



NEW, EXPANDED-TYPE BODY RINGS insure long, tight-seating service life. They're rolled in, can't work loose. Shoulder at bottom of end threads restrains excessive entry of pipe against possible seat damage.

NEW EXELLOY, 12% chromium steel body rings give a hard bearing surface, highly resistant to wear, indentation, scoring and foreign matter damage. Easily replaced bronze disc takes the brunt of normal wear.

New design for tough service...easy maintenance

300-Pound Wedge Disc Bronze Gate Valves

Rising Stem and Non-Rising Stem Patterns

A new body shape that distributes greater strength uniformly against internal stresses and external strains . . . better integrated hex ends, huskier and wider, that add to body rigidity and give a firmer wrench grip . . . new rolled-in, high wear-resisting alloy body rings that don't work loose . . . easily renewed wedge disc—these are typical important features of new Crane bronze gate valves.

On your toughest services, these valves assure ultimate durability . . . new ease of application . . . low-cost repairability. And they're priced no higher than ordinary 300-pound integral seat bronze valves.

Easy to Repair—The Disc Takes the Wear

After long, hard service the hard Exelloy (12% chromium) body rings show no appreciable wear. Normal seating wear is taken by the bronze disc. When needed, a new disc, easily slipped onto stem, provides a practically new, tight-seating valve.

Circular Gives The Facts

For complete technical data on both rising stem and non-rising stem patterns . . . size listing, etc., get Circular AD-2340 from your Crane Representative, or by writing to address below.

CRANE VALVES & FITTINGS

PIPE • PLUMBING • HEATING • AIR CONDITIONING • KITCHENS

Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

For more facts circle 579 on Reply Card

How to "Turn on a Dime"

Today, production men must "turn on a dime" to meet changing output requirements. One day sales are off—machines are idle; the next equipment must produce at top speed to meet a rush order. This requires unusual flexibility in both men and machinery.

To help solve this problem, General Electric offers a new, packaged, adjustable-speed drive—the Speed Variator. Offering wide speed ranges and good regulation, it can help your machines produce a greater variety of goods, faster and at lower cost per unit.

Find out how this versatile new drive can help you keep pace with today's fast changing production demands. Write for GEA-6643. *Direct Current Motor and Generator Department, Erie, Pennsylvania.*

813-20A

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 580 on Reply Card

NEW PRODUCTS

(Begins on page 148)

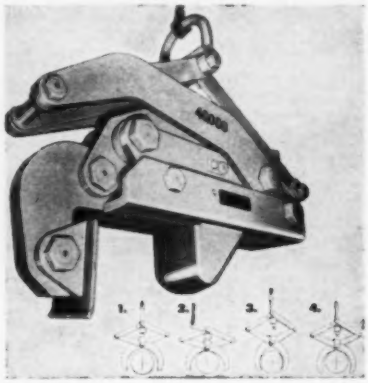
According to company, unit offers the advantage of almost total elimination of overspray resulting in material savings up to 40 per cent and permitting work in open areas without use of conventional spray booth. Completely self-contained, the Chieftain HydraAirless combines an explosion-proof heater and divorced action pump in a mobile unit which carries the original 5 or 10 gal container. Circulation is maintained for temperature control, and operator can dial paint temperature. Unit is capable of operating one gun on hose line up to 75 ft long, or two on lines to 50 ft. Spee-Flo Co.

8—JACKETED VALVES provide low flow resistance

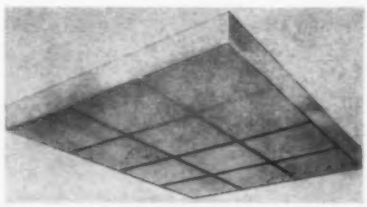
These jacketed "Y" valves are designed to provide the low flow resistance of gate or plug valves with the convenience and control of a globe valve. It is expected that these valves will also find extensive use as flush valves under jacketed tanks and vessels. The valves can also be supplied in the packless type, bellows sealed between bonnet and disc. Stems are standard with regular thread but fast lead, quick opening type is also available. Current production is 2- and 3-in. line size, but full range of sizes from 1¼ to 8 in. is planned. Standard material is semi-steel but they are also available in ductile iron, Ni-Resist, bronze, steel and stainless steel construction. Parks-Cramer Co.

10—TONGS can operate in the limited-space areas

For use in areas where space is too small for lift truck operation, Cranehands operate from mill or S-hooks, depending on capacity. The line features an automatic lock that opens on contact with load without aid of electric power or other mechanical devices. As the Cranehand is lowered over the burden (1) in its "locked-open" position, it automatically unlocks upon contact. (2) In that position it is free to grip the load securely. (3) The heavier the load, the tighter the grip. When the load is deposited (4), the Cranehand automatically completes its cycle to the "locked-open" position, ready for the next lift. Cranehand capacities range from 1000 to 50,000 lb; maximum opening is 50 in. They are designed for large material handling, such as bars, billets, ingots, racks. The series includes a Cranehand for handling strip coils. American Forge and Mfg. Co.



(More New Products on page 153)



9—LIGHTING SYSTEM gives dropped ceiling benefits

Large Element Lighting is announced as a new technique in application of high levels of illumination with maximum comfort and uniform low brightness. This fluorescent development includes five sizes of pre-assembled modular units, with a choice of four shielding media. The large modules are used separately or assembled to create a lighting system which provides the effect, low cost and utility of dropped ceiling construction. A saving in installation costs is also claimed.

The modules have exact dimensions in both directions and are used to create any multiple of 2 ft in length or in width from 4-by-4 ft up. With different size units, a variety of areas and patterns are possible. Elements are joinable in both directions. Shielding media includes Cubex and plastic louvers (both providing 45 by 45 deg shielding) polystyrene plastic dish and Holophane Prismalume Controlens. All are used with Slimline lamps, but may be had for use with 800-ma rapid-start lamps. Large Element Lighting is described as easily installed because an element comes assembled and wired; it is hung on rods and levelled. The entire unit hangs free from the walls. Smithcraft Lighting.

5 REASONS WHY YOU SHOULD BUY—

New General Electric Speed Variator

1. Amplistat Regulator offers better speed regulation and adjustable, timed acceleration for improved product quality.

2. Static Exciter, with silicon rectifier, has no moving parts, requires no warm-up, provides more production time, less maintenance.

3. Two-Unit, Four-Bearing M-G Set features Tri-Clad† '55' motor for more dependable performance.

4. Front-Connected Controls, recessed wiring troughs make routine inspection easy, cut maintenance time.

5. Kinamatic* Drive-Motors provide instant response to control signals. For details on this fast-acting motor see next page.

For more information contact your Apparatus Sales Office or write for GEA-6643. *Direct Current Motor & Generator Department, Erie, Pennsylvania.*

In Canada, contact Canadian General Electric, Peterborough, Ontario.

† *Registered Trade Mark General Electric Co.*
* *Trade-Mark of General Electric Co.* 813-9

GENERAL ELECTRIC

More On Kinamatic Motors

NEW GENERAL ELECTRIC DC MOTOR GIVES

Instant Working Power

KINAMATIC* . . . a new standard in industrial direct current motors . . . designed to deliver drive power at the moment you need it!

Split-Second Response . . . larger air gaps reduce electrical time constants . . . smaller armature diameter permits more rapid delivery of torque to load . . . means faster starts, stops, reversals.

Low Inertia Armature is dynamically balanced, banded with steel and glass . . . gives dependable, high-speed operation . . . skewed armature slots minimize torque pulsation, permit smooth machine operation at low speed.

Other Power Packed Features of new d-c Kinamatic motors help give you more continuous, more automatic production . . . economically.

Additional information is available at your nearest General Electric Apparatus Sales Office. Or, if you prefer, write for Bulletin GEA-6355. *Direct Current Motor and Generator Department, Erie, Pennsylvania.* 813-9

*Trade-Mark of General Electric Company.

Progress Is Our Most Important Product

GENERAL ELECTRIC

NEW PRODUCTS

(Begins on page 148)

11—SINGLE STAGE PUMP, capacities to 500 gpm

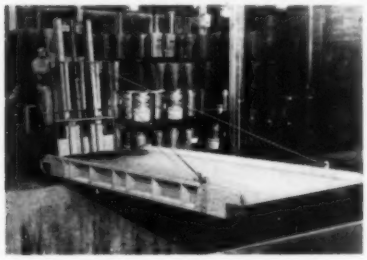
For handling costly or volatile substances at temperatures to 200 F, this Electri-Cand Pump is a single-stage, single-suction pump announced for leakless handling of all liquids. It is available in capacities to 500 gpm, at heads to 250 Ft. Pumps in the ¾- to 1½-hp range are constructed on a fractional motor frame while units from 2 to 15 hp are on an integral motor frame. This pump requires neither mechanical seal nor packing. Carbon sleeve bearings, impervious to many chemicals and corrosive agents, are used in the motor. Pump and motor are an integrated unit. Allis-Chalmers Mfg. Co.

12—GLASS FROSTING sprays on to reduce sun glare

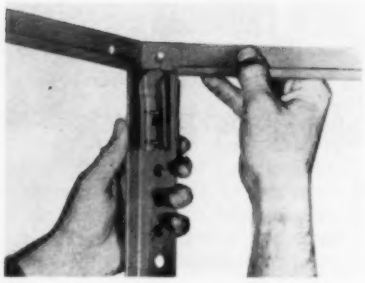
Packaged in an aerosol spray can, this glass frosting is reported easy to apply, fast drying, and non-streaking. It reduces sun glare without color distortion, manufacturer states, the frosting permitting light to pass unchanged except in intensity. Crown Industrial Products Co.

13—REMOVABLE BRIDGES of lightweight magnesium

These magnesium bridges require neither power operation nor counterbalance devices. According to manufacturer, the bridges are readily installed without alterations to



existing docks and floors and can be removed for railcar spotting. Available in movable, drawbridge and rail-based models, the bridges have non-slip traction surfaces and safety curbs to prevent truck run-off and tire damage. They come in lengths from 10 to 24 ft, widths of 58 and 70 in. Load capacities range from 7000 to 16,000 lb. Applications include connecting plant and warehouse buildings, spanning railroad spur tracks. Magline Inc.



14—BOLTLESS SHELVING is strong, easily installed

Penco T Line Shelving is designed for fast installation, easy rearrangement of shelves and high strength and rigidity. Basic element of this adjustable steel shelving is its channel clip. The male part of this clip has two stamped T's that insert through the holes in the upright angle post. The female unit slides over these T's, clamping both parts in place. When this is done, the clip's flared top fits under the edge of the shelf. Supported at all four corners with these clips, the shelves are claimed strong and rigid, yet easily rearranged on 1-in. centers.

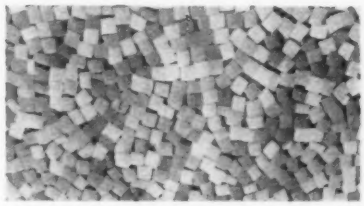
This line comes in open and closed type standard shelving and in ledge and counter units in a variety of sizes. It is made in depths of 12 through 36 in., heights from 3 ft 3 in. through 10 ft 3 in. Standard width is 36 in. Boxes, drawer case units, bin fronts, dividers, doors and other accessories are available. Units have gray or green enamel finish. Penco Div., Alan Wood Steel Co.

15—INSTRUMENT CLOCK is gas-powered device

The Gasclok is a self-contained air- or gas-powered instrument drive and timing unit for use in recording instruments. It is reported to deliver a constant power output of more than 20 times the torque supplied by conventional spring-wound clock mechanisms. Manufacturer says the Gasclok power drive can be used with all types of instruments requiring chart records from 1-hr to 30-day periods, including integrating orifice meters, strip chart recorders, pressure recorders, telecounter units, others. It is described as inherently explosion proof and internally sealed to prevent corrosion or clogging. All parts exposed to gas are aluminum or stainless steel. It has a gas or air consumption of 5 cfh at its normal operating pressure of 5 psi. It is designed for mounting in any position. American Meter Co.

16—COATING protects those rusted and pitted surfaces

Rustikote is announced as a coating to protect and preserve rusted and pitted surfaces which cannot be properly prepared for protective painting—where it is impractical to clean the iron or steel to bare metal by sandblasting or other means. With loose rust removed, Rustikote bonds firmly to the surface and to pitted areas and sets up a hard, dense, protective film, says manufacturer, and it protects the surfaces from further rusting. Available in clear and aluminum colors, Rustikote is reportedly an excellent finish in itself without additional finish coats. Tropical Paint Co.

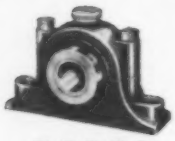


17—VINYL FLOORING is durable, good looking

Vinyl Corlon flooring in the new Tessera series is made in a heavy 0.090-in. gage sheet form, 6 ft wide, and comes in seven tone-on-tone colorings. Advantages announced for this flooring are exceptional durability, ease of maintenance, and design. Since it is made with a moisture resistant backing, the material may be used in below-grade spaces as well as on suspended and on-grade floors, it is pointed out. Tiny square-faced vinyl tiles make up the wearing surface of Tessera Vinyl Corlon. These cubes, while standing out individually in the design, are embedded in vinyl and surrounded with vinyl grout. The surface is slightly embossed and this breaks up the natural high gloss of the plastic. Armstrong Cork Co.

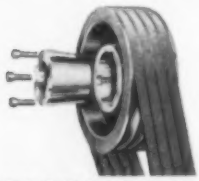
18—FLEXIBLE CONNECTOR for the Freon lines

Developed especially for Freon lines, Flex-Hose, Type F, is claimed to eliminate transmissions of vibration and pulsation from air-conditioning and refrigeration equipment. This flexible connector is made from corrugated, seamless bronze tubing, protected and reinforced by a braid covering to provide high burst strengths. It has sweat-fitting copper tube ends for attachment to rigid



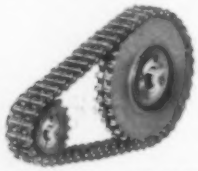
DODGE PILLOW BLOCKS

Timken Bearing Equipped.



TAPER-LOCK SHEAVES

Easy on — easy off! Mount flush!



TAPER-LOCK SPROCKETS

No reboring — no waiting!

Write for Bulletins!

- Roller Bearings. Load ratings, dimensions, etc. Bulletin A-638.
- Taper-Lock Sheaves. Drive tables and technical data. Bulletin A-661.
- Taper-Lock Sprocket and Dodge Roller Chain data. Bulletin A-644.

DODGE MANUFACTURING CORPORATION
2700 Union Street • Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

For more facts circle 581 on Reply Card

NEW PRODUCTS

(Begins on page 148)

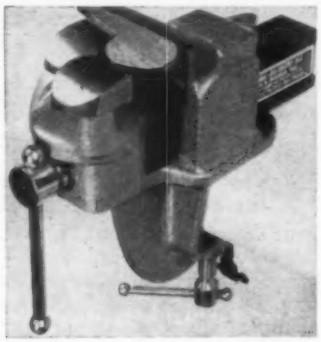
metal piping. The hose is designed to withstand continuous operating temperatures to 400 F and working pressures to 150 psi, depending on methods and materials used in attaching it to rigid piping. Ten sizes which accommodate equipment fittings from ¼ to 2⅛ in. OD have single high tensile braid; the four sizes from 2⅝ to 4⅛ in. OD have double braid. Bulletin K10A gives full data. The Korfund Co., Inc.

19—HYDRAULIC FLUID can stand high temperatures

QF-6-7009, a synthetic fluid, is an aklyl silane, reported to hold promise as hydraulic fluid for use in systems subjected to temperature and environmental extremes, and as a base oil in high temperature turbine lubrication. It is claimed to have better lubricating properties than many previously available high-temperature fluids. Manufacturer says it is stable in closed systems over the range of –25 to 550 F for long periods—up to 700 F for short durations. Dow Corning Corp.

20—IMPROVED VISE holds all kinds of shapes

In the All-Shapes Vise, a pair of pivoted members, mounted on a heavy swivel turret, replace the usual sliding front jaw. This combination of swivel and pivoting action

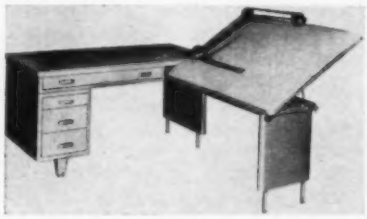


allows the two portions of the jaw to equalize and adjust automatically to practically any shape. Because the multi-point contact distributes jaw pressures widely and evenly, even thin-walled shapes or fragile materials can be held firmly without distortion, it is stated. The vise is available in clamp-on or swivel-base models, both having a 3-in. capacity. R. S. Wilder, Inc.

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 219-220.

21—WORK CENTER combines desk, drawing board

This desk and drawing board combination is an all-steel L-shaped unit with over a total of 27 sq ft of surface. Called the Designers Unit, it provides separate, yet easily accessible work areas in a minimum



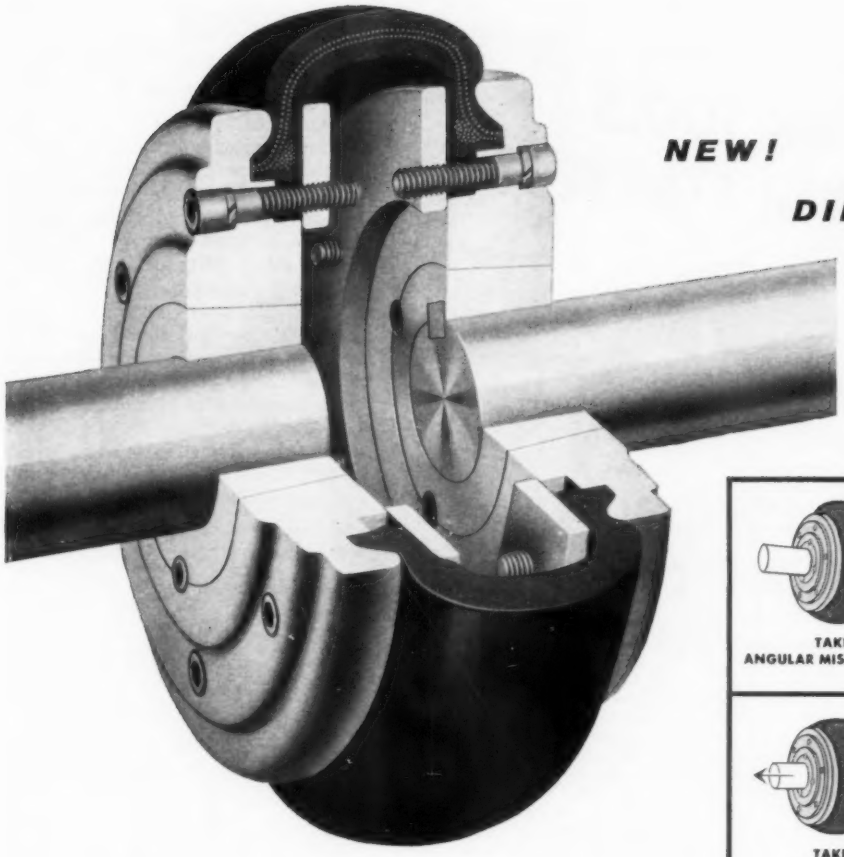
of space—keeping a drawing board within a short idea's distance of the desk. Since the drawing board drops to a horizontal position, the full work surface is available as a table top for conference use. Designers Units come in lefthand or righthand models, in two-tone combinations of fourteen colors. The desk top is 60 by 30 in., surfaced in linoleum, maple or white pine. The linoleum-covered drawing surface measures 60 by 36 in. and can be elevated to an angle of 85 deg. The top drawer of the desk is big enough for large plans and blueprints. Columbia-Hallowell Div., Standard Pressed Steel Co.

22—BLOCK FILL is improved water repellent material

This block and cavity fill insulation is treated and processed to resist moisture penetrations. Reductions up to 50 per cent in heat transfer through masonry walls are accomplished when cores are filled with the material, says manufacturer. It is described as a free-flowing mineral, water-repellent vermiculite, easily poured from the bag into block cores. A complete block wall can be erected, then insulated, without any bridging taking place, according to manufacturer. Zonolite Co.

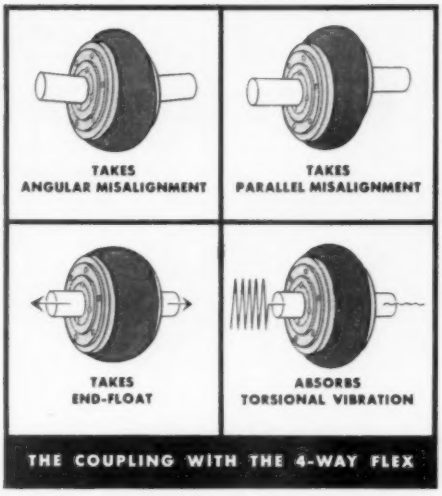
23—ELECTRONIC RECORDER is miniature unit

This all-electronic two-pen instrument records two variables on a single chart, permitting one-glance checks of a pair of related variables, as well as saving panel space. As an



NEW!

DIFFERENT!



DODGE

Para-flex

FLEXIBLE CUSHION COUPLING

THIS coupling "swallows up" shaft misplacements. It automatically compensates for end-float, parallel misalignment, angular misalignment *or any combination of all three.* Moreover, it cushions the stresses of shock loads. And it absorbs torsional vibration—reducing noise and protecting machinery from vibration's destructive forces.

Here is a new type of performance—made possible by the development of a tire-like flexing element. Synthetic tension members, bonded together in rubber, give this element the stamina and dependability of modern, high-speed, high-load, shock-absorbing truck tires—and the ability to respond magically to all manner of changing shaft conditions.

Para-flex takes minimum space on the shaft. Mounting is simplified through the use of standard Taper-Lock bushings—no reboring, no machining. Safety is promoted by flush design; there are no protruding parts. No lubrication is required, no periodic inspection. And since the flexible member is molded with a transverse split, it can be replaced *without moving either the driver or driven machine.*

Para-flex Couplings are stocked by Dodge Distributors in popular transmission sizes. They are available from factory stock in capacities up to 825 hp at 1200 rpm. Call your distributor for early delivery to *make your own test.* You'll witness something revolutionary!

DODGE MANUFACTURING CORPORATION, 2700 Union, Mishawaka Ind.

DODGE

of Mishawaka, Ind.

CALL THE TRANSMISSIONEER—your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look in the *white* pages of your telephone directory for "Dodge Transmissioneer."

For more facts circle 582 on Reply Card

AIR TOOLS POWER STARVED?

Get WAYNE

JOB-ENGINEERED COMPRESSORS

Guaranteed Full Rated Output

Capacities ⅓ HP to 50 HP, Vertical and Horizontal; Single and two stage.

Power-starved tools slow production, steal profits. Now, you can be certain every air tool gets the proper pressure at all times with a Wayne Air Compressor "engineered to the job." They take the guesswork out of airpower in your plant.

Wayne prescribes the right "Job Engineered" Air Compressor for your specific needs and gives you not a theoretical displacement rating, but a guaranteed, full-rated usable air output on which to base your planning and operations.

What's more Wayne Compressors invite a quality comparison with any compressors. The comparative check-chart below gives you some of the reasons it will pay you to specify Wayne Air Compressors. For full details on how to select and purchase compressors for maximum production efficiency, write for your free copy of the new air compressor handbook and catalog.

THE WAYNE PUMP COMPANY
Industrial Division
Fort Wayne 4, Indiana
Division of Symington Wayne Corporation

QUALITY FEATURES	WAYNE	A	B	C	D	E	F	G	H
DUAL PAN CONSTANT LEVEL OILING SYSTEM	YES	NO	NO	NO	NO	NO	NO	NO	NO
DUAL INTAKE VALVES	YES	NO	NO	NO	NO	NO	NO	NO	NO
SMOOTH COPPER TUBING INTER. & AFTERCOOLER	YES	NO	NO	YES	NO	YES	YES	NO	NO
TAPERED CRANKSHAFT FOR FLYWHEEL ATTACHMENT	YES	NO	NO	NO	NO	YES	YES	NO	NO
FOUR PIECE OIL RESERVOIR, CRANK-CASE, CYLINDER AND HEAD CONSTRUCTION	YES	NO	NO	NO	NO	NO	NO	NO	NO
THERMAL PROTECTION STD. EQUIPMENT	YES	YES	NO	NO	NO	NO	YES	NO	NO
FOUR PISTON RINGS	YES	YES	NO	YES	NO	YES	NO	YES	NO

Wayne Industrial Products

For more facts circle 583 on Reply Card

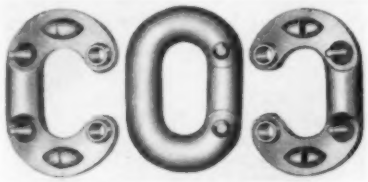
NEW PRODUCTS

(Begins on page 148)

optional feature, the recorder can be furnished with a control set point, or alarm contacts, or both, for one of the variables. The recorder fits a 5-in.-square panel cutout and is housed in standard 24-in. deep panels. Most parts are interchangeable with company's single-pen recorders. The unit contains two separate but identical signal amplifiers and pen-actuating mechanisms on a single chassis. An interlocking arrangement is provided to keep the recorder from being removed from the case while the power is on. Specification A805 gives further information. Swartwout Co.

24—LINKS connect chain quickly, permanently

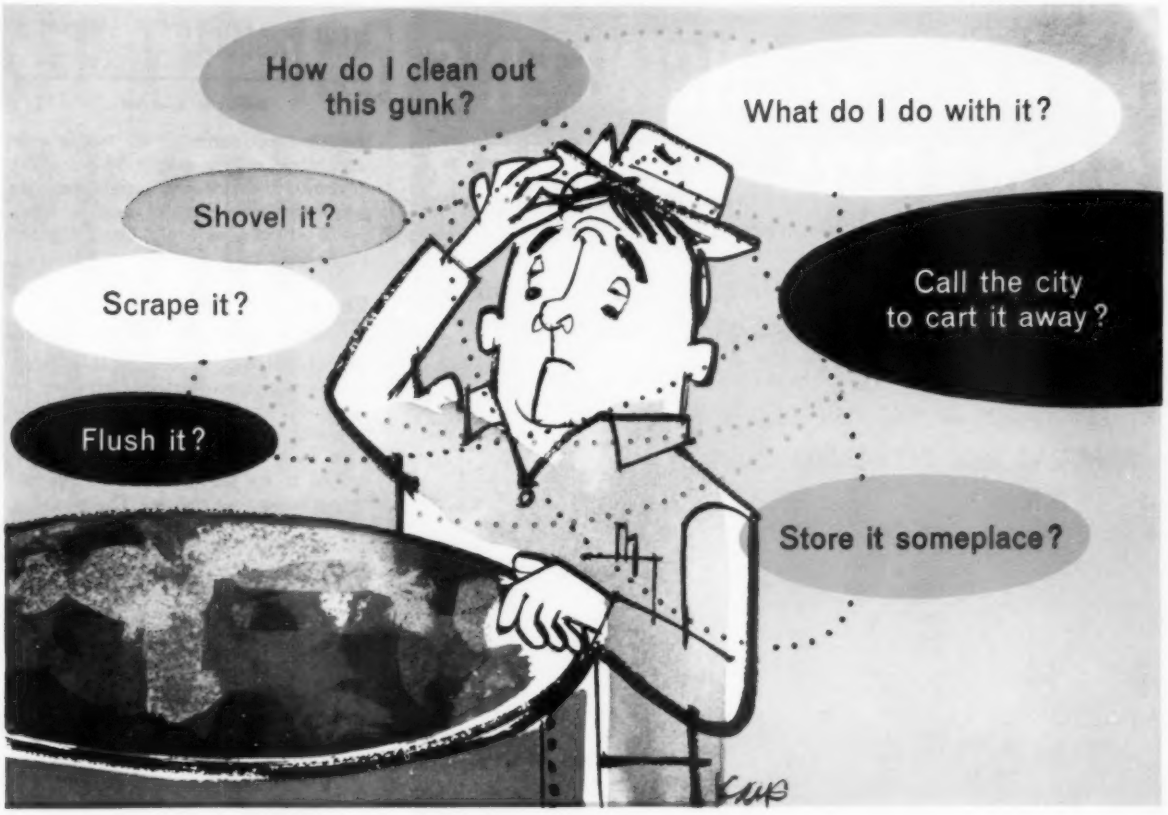
Connecting hooks, swivels or rings to chain, or repairing chain is now done quickly, company announces, with "Missing Links." Halves of Missing Links are joined simply by



peening together. The resulting connection is claimed stronger than welding, safer than cold shuts or cast links. The drop forged, heat-treated halves have integral rivets and interlocking lugs which evenly distribute the load throughout the link when joined. Missing Links come in popular chain sizes, from 3/16 to 1⅞ in. Catalog 950-2 gives further details on them. Crosby-Laughlin Div., American Hoist & Derrick Co.

25—ALUMINUM PAINT serves as its own primer

Dur-Aluminum is announced as a one-coat aluminum paint which makes a primer first coat unnecessary—even on lightly rusted metal surfaces. The paint provides a bright corrosion-resistant finish. It is recommended for hard-to-reach areas, or where speed of application is important. Made with a rust and corrosion inhibitor, it possesses excellent covering capacity, company notes, and works best on clean or lightly rusted surfaces. While single-coat finishes usually give less than half the service of two-coat systems, one-coat exposure tests of Dur-Alu-



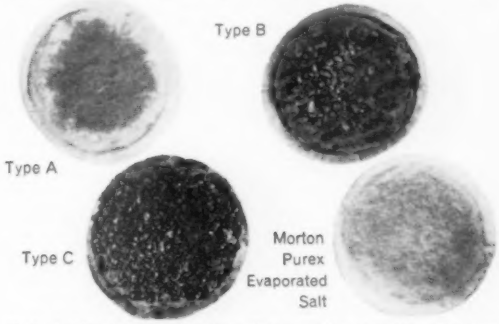
Brine tanks never need cleaning out when you use sludge-free Purex Salt

Yes, we mean never! You prevent costly shutdowns for maintenance. You save time and completely eliminate labor costs for cleaning out brine tanks. For Morton Purex Salt is 100% soluble. It will leave no accumulation of sludge—shale and sulphates—in either your brine or water-softening system.

What's more, none of your purchase price or freight bill for Purex goes toward paying for insolubles. This is an important saving, for in every 100 lbs. of ordinary salt you buy, you assume the risk of paying for up to 5 lbs. of shale and sulphates. In a 50-ton carload of ordinary salt, you may pay for as much as 5,000 lbs. of sludge. And you buy salt with "built-in" maintenance problems.

With sludge-free Morton Purex Salt, you get high-purity evaporated salt made in a controlled-particle size to prevent packing and channeling. Purex can be used in bulk wet storage systems and in the Morton Model E Brinemaker.

These filter pads (approximately 1/6 actual size) show you how much insoluble matter (sludge) you get in just 5 lbs. of various types of salt



Tests for insolubles taken from these random samples show you that Morton Purex is the only one that contains no wasteful sludge or insolubles.

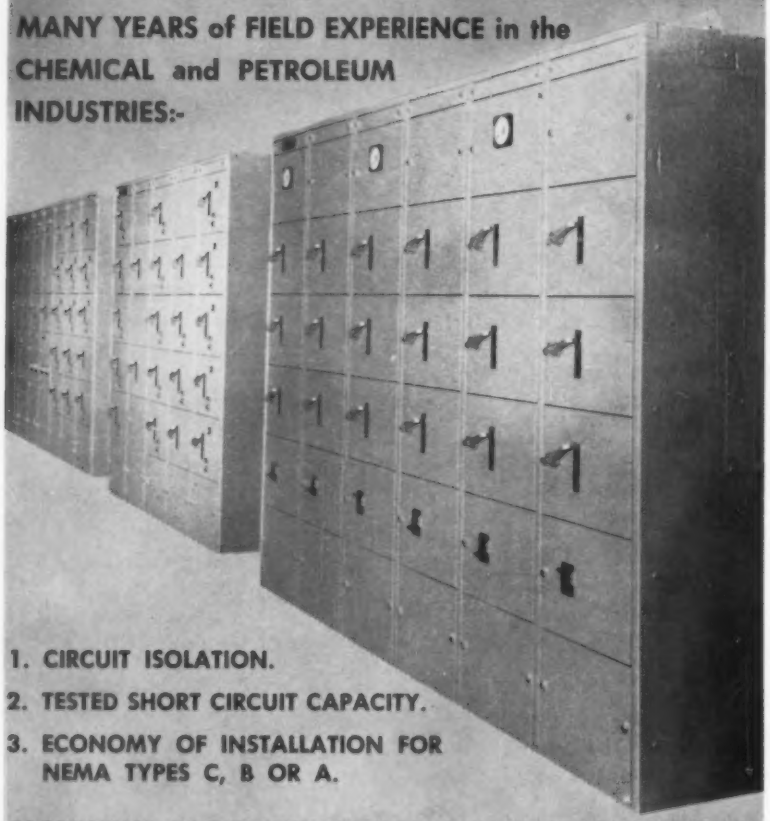
For more information about Morton Purex Salt and for free, expert help on any water-softening or brine-making problem, write or wire:

MORTON SALT COMPANY
INDUSTRIAL DIVISION
Dept. PE-11-58, 110 N. Wacker Drive
Chicago 6, Illinois

For more facts circle 584 on Reply Card

HERE *is the* ENGINEER'S CONTROL CENTER

WITH POSITIVE FEATURES THAT WERE DEVELOPED and DESIGNED INTO THIS ALL-NEW MAXIMUM PROTECTION CONTROL CENTER as the RESULT of MANY YEARS of FIELD EXPERIENCE in the CHEMICAL and PETROLEUM INDUSTRIES:-



1. CIRCUIT ISOLATION.
2. TESTED SHORT CIRCUIT CAPACITY.
3. ECONOMY OF INSTALLATION FOR NEMA TYPES C, B OR A.

MAXIMUM PROTECTION CAN ONLY BE ACHIEVED BY COMPLETE **CIRCUIT ISOLATION** PLUS TESTED SHORT CIRCUIT CAPACITY.

SEND TODAY for your copy of the new TECHNICAL DESIGN DATA BOOK of maximum protection control centers.

NORTHEASTERN ENGINEERING, INC.
MANCHESTER, N. H. • 25 So. Bedford St.
P. O. Box 150 • NAtional 2-6485

For more facts circle 585 on Reply Card

NEW PRODUCTS

(Begins on page 148)

minum are claimed to indicate a durability rating nearly 70 per cent of two-coat systems employing an anti-corrosive primer and a high grade aluminum finish coat. Carter Paint Co., Inc.

26—HAND GRINDER made for operator convenience

Model DH-612, newest of this company's precision surface grinders, is designed for convenience of use by operators of all sizes and capabilities. The 6-in. adjustment permits best height to be selected for an operator, standing or sitting. The position

of the downfeed handwheel, 12 in. out from the column, places it at eye level and within reach, but out of the way of accidental bumping. Each revolution of the handwheel equals 0.025-in. feed, half the travel of many grinders. According to manufacturer, this widens the calibrations so that "split tenth" grinding is performed without eyestrain. The crossfeed handwheel also has wide 0.0005-in. graduations, and the table feed handwheel can be on either side of the saddle for right- or left-hand operation. Table feed is by a timing belt drive. The Model DH-612 uses the same 1-hp motorized spindle used on company's larger grinders, and similar attachments are available. The DoAll Co.

27—GROUTING is strong and resistant to chemicals

For grouting machinery where vibration and other operating conditions are unusually severe, Ceilcote 648 Grout is claimed to offer high compression and tensile strength, extremely high grout-to-metal bonding strength and fast hardening. Because of its physical and chemical properties this grout can withstand vibration, load, temperature and corrosion conditions where

SEE THE 1959 NATIONAL PLANT MAINTENANCE & ENGINEERING SHOW *and Conference*

CLEVELAND PUBLIC AUDITORIUM
JANUARY 26-29, 1959

Your top investment in plant efficiency! More than 350 leading manufacturers will show machines, equipment, and services to cut costs, improve plant operations. You'll hear and talk with outstanding experts, get hundreds of dollar-saving, method-bettering ideas — in four profit-packed, on-the-job days.

Attend the conference too. Hear top experts discuss your plant maintenance management problems. For free show registration tickets and conference information write to

Show Management, Clapp & Poliak, Inc.,
341 Madison Avenue, New York 17, N. Y.
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WHAT YOU'LL SEE

Electrical Equipment
Building Materials & Services
Welding Equipment
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Power Transmission Equipment
Materials Handling Equipment
Instruments, Meters, Gauges
Management Consultants and Services
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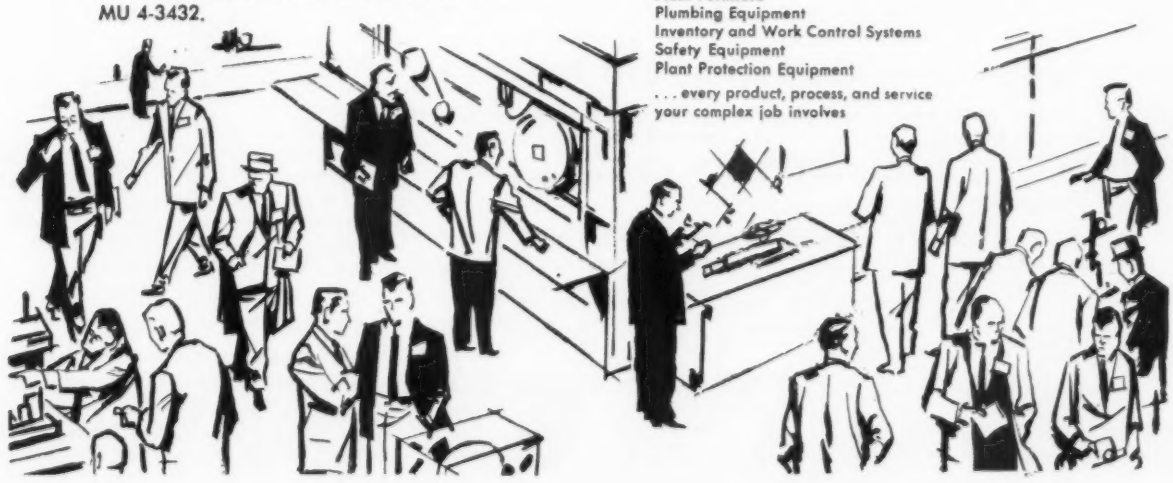
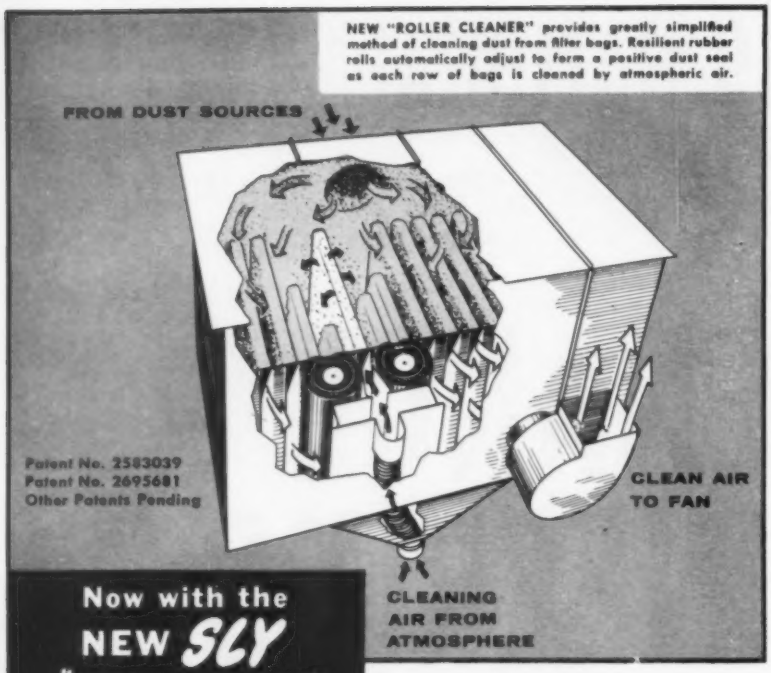
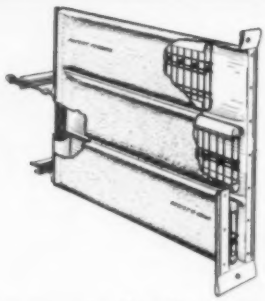
Power Generation and Distribution Equipment
Pollution Control Equipment
Communication Systems
Sanitation and Cleaning Equipment
Storage Equipment
Plant Furniture
Plumbing Equipment
Inventory and Work Control Systems
Safety Equipment
Plant Protection Equipment

. . . every product, process, and service your complex job involves




NEW "ROLLER CLEANER" provides greatly simplified method of cleaning dust from filter bags. Resilient rubber rolls automatically adjust to form a positive dust seal as each row of bags is cleaned by atmospheric air.
FROM DUST SOURCES
Patent No. 2583039
Patent No. 2695681
Other Patents Pending
CLEAN AIR TO FAN
CLEANING AIR FROM ATMOSPHERE

Now with the NEW SLY "ROLL-CLEAN" DYNACLONE



As much as 3 TIMES LONGER BAG LIFE

NEW SLY "RESIST-O-WEAR" FILTER BAGS (patent pending) provide complete dust filtration with as much as three times longer life than conventional bags. This has been proved on the toughest field installations.

The new bag has three equal-size sections. Each pocket has two spacers, making a total of six per bag. Weight is distributed on three seams rather than one, minimizing strain. A special protective flap on the back end prevents abrasion from incoming dust.

Now standard in the new "Roll-Clean" Dynaclone, Sly "Resist-O-Wear" bags combine with all the other superior Dynaclone features to assure greatest dust collecting efficiency with unequalled maintenance-free service.

ALL THESE FEATURES IN ONE DUST FILTER

- New "Resist-O-Wear" bags last as much as three times longer.
- Constant suction at dust sources—complete dust collection.
- Automatically self-cleaning for continuous operation.
- Free-rolling cleaner. Complete dust seal—automatic seal adjustment.
- Greater filtering capacity; smaller space requirements.
- Simplified construction for ease of inspection and servicing.

SEND FOR New Bulletin 105 and New 36-page Dust Control Catalog 104.

SINCE 1876 SLY

THE W. W. SLY MANUFACTURING CO.

4600 TRAIN AVENUE • CLEVELAND 1, OHIO
OFFICES IN PRINCIPAL CITIES

For more facts circle 587 on Reply Card

NEW PRODUCTS

(Begins on page 148)

many grouting materials fail, says manufacturer. Tensile strength is given as 1950 psi, nearly five times that of concrete, compression strength as 15,000 psi, and bond strength to steel, approximately 1000 psi. Also reported are greater impact strength and abrasion resistance, minimum shrinkage, imperviousness to oils, and low moisture absorption. Formulated from a modified resin and inert fillers plus hardeners, Ceilcote Grout 648 may be poured in depths to 6 in. at one time. Small equipment can be returned to operation 24 hr after final pour, it is stated; a 48-hr cure at normal temperatures is safer for larger equipment. The Ceilcote Co.

28—FLOOR CEILING SYSTEM offers design flexibility

More flexibility in structural designing and less time on the job are claimed for this combination floor-ceiling system, for single-floor or multi-story buildings. It can be used simultaneously to: distribute air, contain recessed light fixtures, house

a sprinkler system, provide electrical and telephone raceways in the structural subfloor, furnish acoustical control and maintain ceiling height by eliminating extra space for conventional air conditioning ducts. The system is based on company's Cel-beam, a decking adaptable to many variations, ranging from a simple roof ventilator to combination uses. This decking can also be used in remodeling structures where use of bar joists and conventional duct work would cause a loss of head room, it is pointed out, or in lining up floor levels of a new multi-story addition with those of an existing structure. The system is reported to provide a neat-looking installation. The R. C. Mahon Co.

29—SAFETY CLEANER handles variety of jobs

This heavy duty safety cleaner and degreaser is furnished in high concentrations to be diluted with water to clean everything from conveyors

At Rhoads, the Job Selects the Belt

In the Rhoads' family of beltings, there is a flat belt that is exactly right for your operating conditions.

It may be Tanastic, new leather/plastic belting with a stretch-free nylon core.

It may be Texalon, new all-synthetic belting of fabric and nylon . . . elastic and almost 100% stretch-free.

It may be Tannate leather belting, the product of more than 250 years of tanning experience.

Rhoads' Engineers Consider All of the Factors Involved

The advantages of the flat belt drive — economy in original cost and in operation; highly efficient speed reduction; shock absorption; high degree of safety; flexibility in placement of motor — all these advantages and many others are used by Rhoads' engineers.

Based on the job the belting is to do, and the operating conditions involved, Rhoads recommends the belting that is engineered to your needs.

CUT COSTS

with new TANASTIC leather/plastic belt

Nobody knows how long Rhoads Tanastic will last. "It's still running" is the report from scores of mills where this new leather/plastic "sandwich" belt is delivering power smoothly and uniformly, regardless of shock loads.

No-stretch Tanastic cuts mechanical power transmission costs by eliminating belt adjustment. Increases production by preventing unscheduled shutdowns. Permits faster driven speeds and a wide variety of speed changes.

Cone drives on new lineshaft papermaking machines use Tanastic belts down to one-third the width of previous belts. Tanastic belts are economical for almost any mechanical power transmission requirement, including the replacement of V-belts and other type flat belts.

Rhoads engineers have a storehouse of case histories on the successful application of Tanastic with its stretch-free nylon core. For bulletin, address Engineering Department, J. E. Rhoads & Sons, Wilmington, Delaware.

RHOADS

Since 1702 . . . Pioneers in Mechanical Power Transmission

For more facts circle 588 on Reply Card

Practical Idea for the Production Man

Efficient electric hoists...to move materials overhead and release floor space for more valuable operations.

CM HOISTS

CM LODESTAR ELECTRIC CHAIN HOIST
⅛ to 1 ton capacites—First truly heavy duty version of small electric hoist. ⅛ ton model weighs only 51 lbs. Heavy duty self-adjusting brake. Upper-lower safety limit switches. CM-Alloy load chain.

CM METEOR ELECTRIC WIRE ROPE HOIST
½ to 5 ton capacities—Compact, enclosed design. Low headroom. Continuous duty motor with thermal overload protection for heavy duty service. Precision bearings and helical gears for long life. Only 110 volts at push button control.

Good Suggestion for the Maintenance Man!

Rugged lightweight hand hoists and pullers...to make your job easier and safer

CM CYCLONE HAND HOIST
¼ to 10 ton capacities—Easy to carry and lift. One ton model weighs only 36 pounds. Made of tough aluminum alloy. CM-Alloy load chain. High efficiency. Lifetime lubrication.

CM PULLER THE "ONE MAN GANG"
¼ to 6 ton capacities—Lifts or pulls at any angle. Lever handle operation. Automatic load brake holds at any point. ¾ ton model weighs only 13 pounds. CM-Alloy flexible load chain.

ALSO... *CM Trolleys and Cranes*

Call the CM distributor for descriptive literature, prices and fast delivery from stock.

CM HOISTS AND CHAIN

CHISHOLM-MOORE HOIST DIVISION
COLUMBUS McKINNON CHAIN CORPORATION
TONAWANDA, NEW YORK
REGIONAL OFFICES: NEW YORK, CHICAGO, CLEVELAND
In Canada: McKINNON COLUMBUS CHAIN LIMITED, ST. CATHARINES, ONTARIO

For more facts circle 589 on Reply Card

NEW PRODUCTS

(Begins on page 148)

to washrooms. According to amount of water used for dilution, Safety Spray can be used for heavy duty degreasing of machinery, motors, diesel equipment, etc., fixtures, tile, glass, floors in washrooms and grills, range hoods, exhaust fans in kitchens or cafeteria. It is claimed safe to use on aluminum and other soft metals. Described as non-flammable, non-toxic and harmless to hands, Safety Spray contains inhibitors to prevent rust and corrosion of metal surfaces. Spray application is recommended and manufacturer supplies metal, sprayer/fogger unit free on initial drum orders. Harco Chemical Co.

Use the Reader Service Cards provided on pages 219-220 to ask for more information on these products. Circle item numbers of products in which you are interested.

30—LIGHTING FIXTURE is quick-disconnect unit

Type VNF is announced as a quick-disconnect vaportight lighting fixture which can be installed and removed in seconds. In an area where a light-

ing fixture might ordinarily be an obstacle, but light is sometimes needed, the Type VNF is reported particularly useful. It is also suitable for locations where a few fixtures can be used to do the work of many. Weatherproof receptacles can be installed, indoors or outdoors, and the fixture carried from one location to another. Crouse-Hinds Co.

31—RATIO REGULATOR proportions and blends

Described as a fundamentally different type of liquid ratio regulator, the Type R is designed to automatically proportion and blend a secondary stream to the measured flow of an uncontrolled primary

Lower housekeeping costs? Pangborn Dust Control! Here's why!

Yes, this fascinating booklet *tells* you why. It tells you what Pangborn Dust Collectors have done for many different companies in many different fields. How they have cut plant housekeeping costs for these firms . . . lengthened machinery life, improved employee efficiency and morale, reclaimed material for salvage. How Pangborn can give *you* these benefits.

Why Pangborn Dust Control? Because Pangborn offers the most efficient methods of dust collection on the market. Pangborn has spent 50 years dealing with dust problems . . . experience that is incorporated in every proposal. And Pangborn's extensive line of wet and dry collectors means that one of these units can be adapted with maximum effectiveness to *any* problem.

Send for your copy of "Out of the Realm of Dust." And remember: the Pangborn Engineer in your area will be glad to take off his jacket and go to work on your dust problem at no obligation. PANGBORN CORP., *3200 Pangborn Blvd., Hagerstown, Md. Manufacturers of Dust Control and Blast Cleaning Equipment.*

Pangborn CONTROLS **DUST**

For more facts circle 590 on Reply Card

NEW! EXCLUSIVE!

MOST POWERFUL
700w, 400w, 250w. REFLECTOR
MERCURY LAMPS

Easily Installed

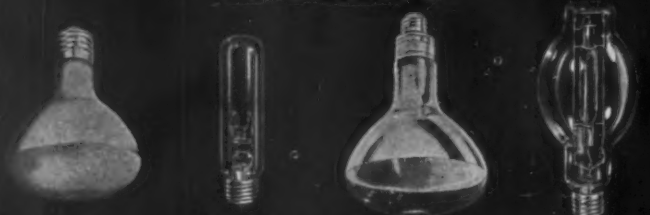
Nickel-plated brass base won't corrode or freeze in socket. Extra clamp assures support for R80.
Weatherproof hard glass. No heavy, enclosed fixture needed. Low-cost installation.
Sealed-in reflector stays bright without cleaning throughout lamp life.

RADIANT

R60 and R80 MERCO-SPOT, MERCO-FLOOD, and MERCO-WHITE Lamps for high, medium, and low bay and outdoor lighting.

MORE LIGHT · LESS POWER · LET US PROVE IT

SEND for BULLETIN 27



R-type incandescent lamps. 150 to 1,500w. | Spatterproof welding lamps. 50 to 150w. | Hi-Heat Infra-Red Lamps. 250 to 500w. | 250, 400, 700, and 1,000w mercury lamps.

RADIANT LAMP CORPORATION

300 Jelliff Avenue Newark 8, N. J.

Manufacturers of Lamps from 50 to 10,000 watts for PROJECTION • SPOTLIGHT • FLOODLIGHT • INFRA-RED AERONAUTICAL • MOTION PICTURE PRODUCTION • MERCURY VAPOR • GENERAL SERVICE

For more facts circle 591 on Reply Card

NEW PRODUCTS

(Begins on page 148)

stream, despite line pressure variations. Flow measurement, ratio control and actual blending are accomplished within a single, self-contained regulator having only two moving parts, operating with minimum pressure difference of 5 psi, and requiring no outside source of power and no straight runs of approach of discharge piping. Only adjustment is a calibrated ratio setting dial. Accuracy combined with split-second response are said to be uniformly maintained throughout a 5 to 1 ratio range, 2 to 1 primary flow range. The W. A. Kates Co.

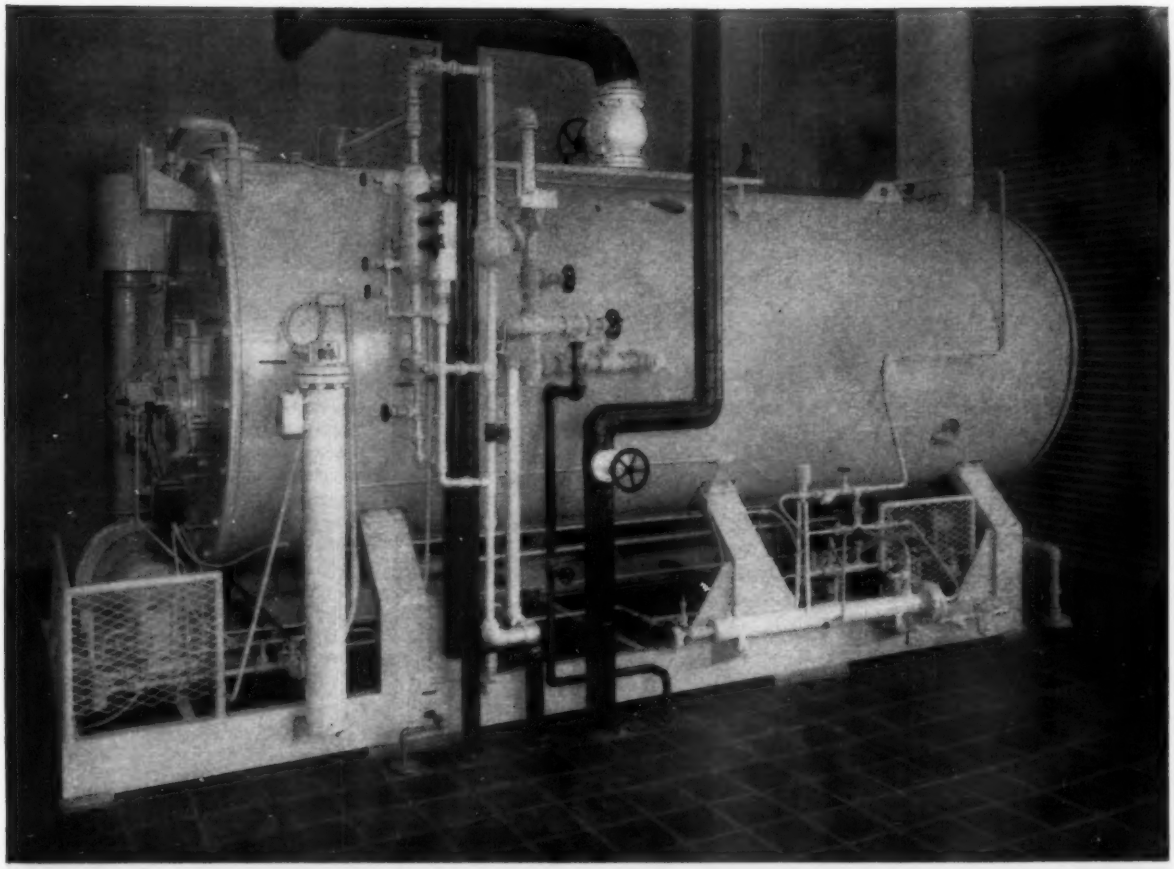
32—DRUM VACUUM UNIT for cleaning, recovery jobs

For vacuuming or material recovery, this heavy-duty vacuum cleaner attaches to any standard open-head 55-gal drum to give a pick-up capacity of 48 gal dry or 40 gal wet

material. It is powered by a 1¼-hp motor, sealed against dirt and water, which drives a two-stage turbine-type centrifugal fan. The cleaner can be fitted with any of manufacturer's line of attachments for large-capacity vacuuming or furnace cleaning. An accessory steel dolly is available to further speed emptying and add mobility. The Black & Decker Mfg. Co.

33—BRIDGE DRIVE UNITS with "cushion start"

The Budgit line of bridge drive units for overhead traveling cranes now includes "cushion start" models. The units are for converting manually operated crane bridges to electric drive. "Cushion start" was developed for applications where smooth, even acceleration and braking are essential to keep load swing or "drift" at a minimum. This is accomplished by a motor brake which spreads the time lapse from start to full bridge



200 HP AMESTEAM GENERATOR Installation at U. S. Concrete Pipe Co.

LOW COST STEAM DELIVERED BY AMESTEAM GENERATORS

BRINGS REPEAT ORDERS FROM U. S. CONCRETE PIPE

Why is it that AMESTEAM GENERATOR customers are almost always *repeat* customers? The reason can be summed up in these words: "Lower Cost Steam". One of these repeat customers is U. S. Concrete Pipe Co., Relay, Md. This firm is one of the leading producers of large concrete drainage pipe and allied products.

Recently the company needed a boiler to supply steam for the structural curing of various concrete products. Successful experience with the AMESTEAM GENERATOR "Package" Boilers proved elsewhere in other plant operations led to selection of the 200 HP unit shown above. U. S. Concrete Pipe found that this AMESTEAM GENERATOR provides the most economical and efficient solution to this important steam problem.

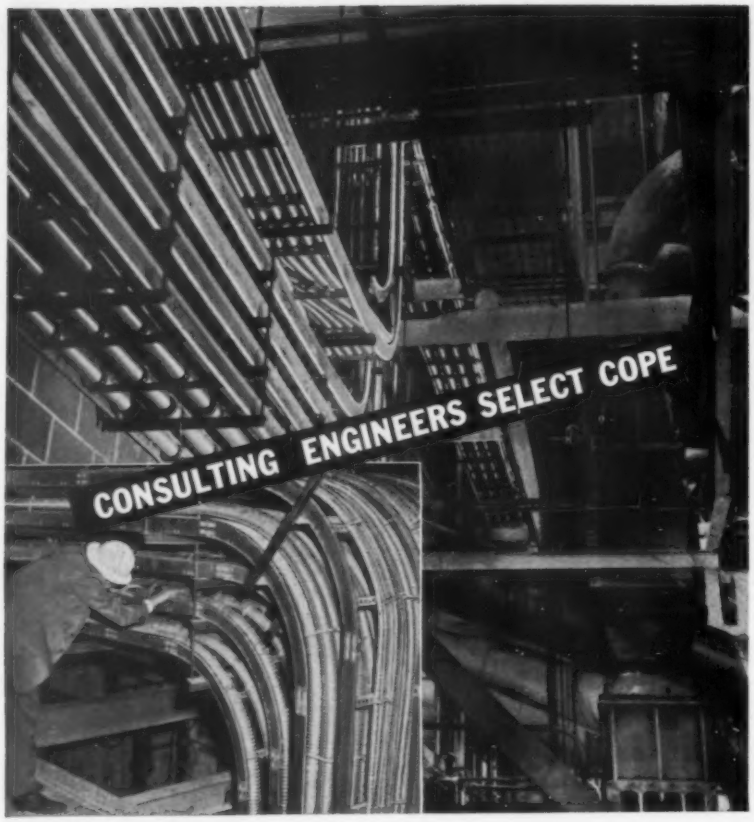
Here is another of the hundreds of users whose complete satisfaction with AMESTEAM's low-cost, dependable performance is indicated by the repeat orders we continue to receive from them. This record for repeat orders is based on AMESTEAM GENERATOR's reputation for *Low Cost Steam*, faithfully delivered over a long period of years.

What's YOUR Steam Problem?

If you need 10 to 600 HP and want the kind of space-saving, trouble-free service enjoyed by satisfied owners of AMESTEAM GENERATORS, write today for our catalog and the name of your nearby Amesteam Dealer.

AMES IRON WORKS, INC.
Box M-118, Oswego, N. Y.

For more facts circle 592 on Reply Card



"MILES OF SAVINGS" RIDE ON COPE CABLE LADDER

Over two miles of Cope aluminum cable ladder support countless miles of aluminum interlocked armored cable at the first unit of Metropolitan Edison Company's new Portland generating station, currently rated at 165,000 KW. Ultimate capacity is expected to be approximately 1,000,000 KW. Selection of Cope cable ladder by Gilbert Associates, Inc., consulting engineers, permitted necessary system flexibility and ease of installation . . . at cost savings and quality not possible with other available methods and materials!

ASK FOR PROOF FROM COPE

Other manufacturers **can only talk about** your system requirements—Cope is prepared to **prove** Cope system performance with accurate technical data, load deflection tables, actual heating tests, etc. Whenever you ask about cable supporting equipment **ask for proof!** Cope has it.

System Layout No Problem

Cope cable ladder combines main stringers of "Z" section aluminum with slotted rungs at specified intervals for securing of cables. Strong, yet lightweight, it is easy to handle, easy to install—even in the most cramped quarters. Cope's *complete* line of fittings and accessories permit required changes in direction, elevation or other conditions of system layout. Cope's pin-type coupler joins ladder straight section and/or fittings in seconds . . . permits easy connection to other Cope systems . . . expanded metal wireway (trough) and cable channel. Every Cope system is **complete** . . . no hardware or other extras to buy later.

Cuts Costs Three Ways

A single run of Cope ladder or wireway supports as many cables as several runs of conduit. From the start, you save in materials and labor costs . . . keep space requirements to a minimum! An easy-to-get-at Cope system cuts maintenance costs, too . . . permits ready re-routing of existing cables or adding of new cables in the future. All Cope cable supporting equipment is available in aluminum or hot dip galvanized steel construction.

Contact your authorized Cope distributor . . . or write to T. J. Cope Division, Rome Cable Corporation, Collegeville, Pa.

1004

T. J. COPE *Division*

ROME CABLE CORPORATION

For more facts circle 593 on Reply Card

NEW PRODUCTS

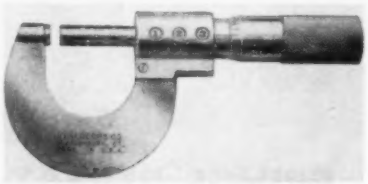
(Begins on page 148)

speed to a maximum of 3½ sec and thus suppresses the load's tendency to swing due to inertia.

The brake operates through centrifugal force and is set when motor is stopped. As the motor speeds up, the brake gradually releases and is completely open at 40 per cent of rated motor speed. In stopping, it closes as the motor slows. At full speed the bridge travels at moderate walking speed; the operator controlling bridge movement by a push button station suspended from the unit. Units can be installed on many makes of cranes with spans up to 55 ft, capacities through 10 tons. Only common tools are needed, and no drilling or machining. Models are available for 220, 440 or 550 v, all with enclosed speed reducer, squirrel cage motor and magnetic contactor controller. All have only 24 v at push button station for safety. Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc.

34—MICROMETER is read from counter-type dial

Being read direct, Speedmike is a basic simplification in micrometer use—greater accuracy and faster

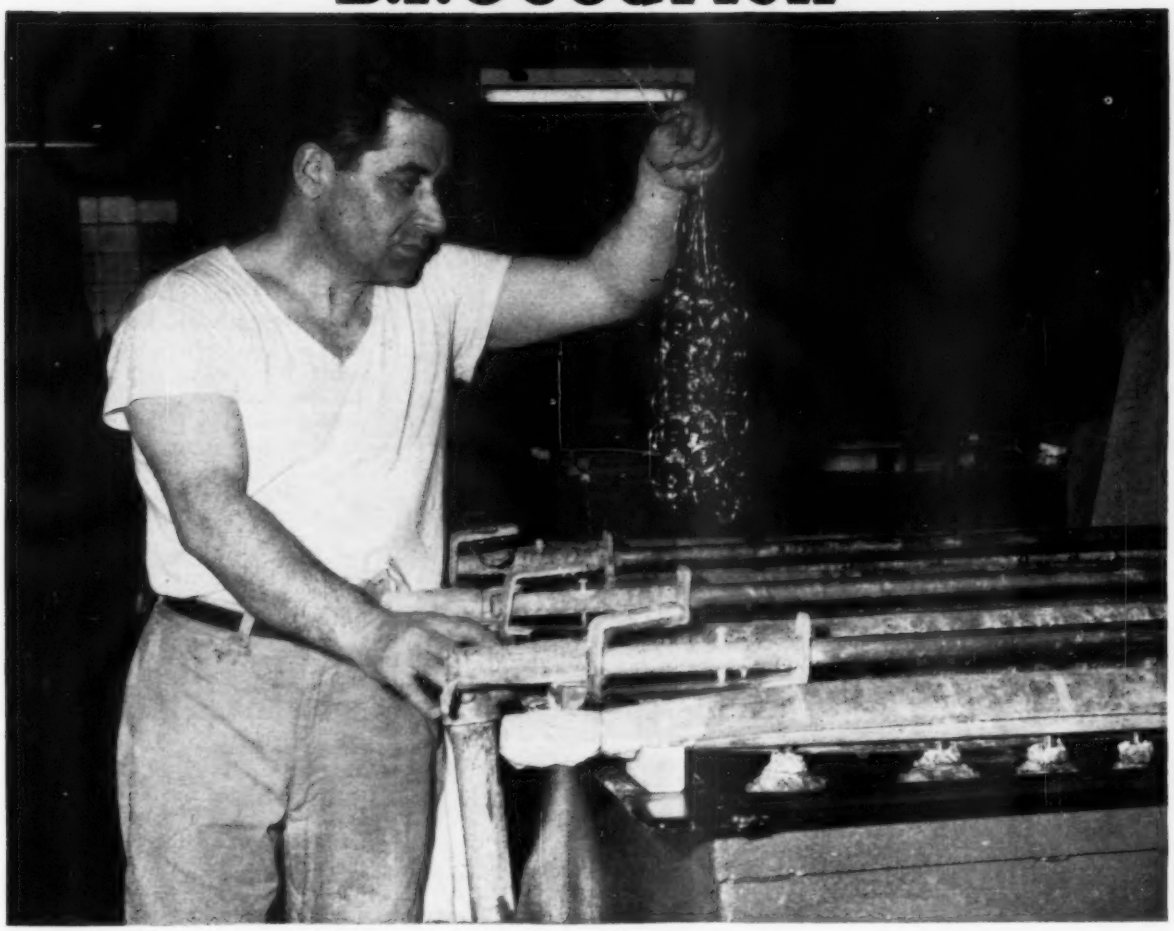


reading are claimed for it. Since it is read from a counter-type dial there is no need to calculate readings. The J. T. Slocomb Co.

35—PATCH KIT repairs the concrete floors, masonry

Epocrete is a two-part, room temperature cure, gray colored, epoxy-based concrete. It cures at room temperature with practically no shrinkage, manufacturer states, and has more than twice the compressive strength of concrete, three times its abrasive resistance, and equal resistance to impact. Adhesion to steel, concrete and wood is reported more than 1000 psi. Applications for this patch kit include repair of worn and cracked concrete, filling of cracks, resetting of bricks, resurfacing of pitted concrete, sealing of leaking cracks and joints in masonry. Company says it can be feather edged

B.F.Goodrich



How Koroseal helps cut cost of nickel-plating jewelry

THE Victory Polishing and Plating Company of Providence, Rhode Island specializes in the nickel-plating of jewelry, turning out such items as nickel-plated cuff links, tie bars, necklace chains and pins. The nickel solution used is highly corrosive and runs at an almost constant 130°F. Ordinary "acid-resistant" hoses continued to fail—they couldn't take the combined assault of corrosion and heat.

Then, in the summer of 1956, the company installed B. F. Goodrich Koroseal rigid polyvinyl chloride pipe. Result: absolutely no maintenance is required, and close examination shows no apparent wear. This company is replacing all of its "acid-resistant" hose with Koroseal pipe, and has lined all its acid storage tanks with rigid Koroseal PVC plate.

Versatile Koroseal has answered countless problems for alert manufacturers. Koroseal is unaffected by most alkalies and acids, and is completely inert in the presence of oil, alcohol, and salt solutions.

Exceptionally easy to install, Koroseal PVC can be threaded, cut, welded or drilled. It has excellent insulation properties, will not support combustion, and never needs painting.

Find out how this light, inexpensive, long-wearing pipe can make your operations more efficient. Fill in and mail the coupon on the right. *B. F. Goodrich Industrial Products Company, Marietta, Ohio.*

For more facts circle 594 on Reply Card

B.F.Goodrich

INDUSTRIAL PRODUCTS CO.
MARIETTA, OHIO

B. F. Goodrich Industrial Products Co.
Dept. PE-11, Marietta, Ohio.

Please send me free booklets on:
☐ Rigid Koroseal Pipe
☐ Rigid Koroseal Sheet

Name_____

Company_____

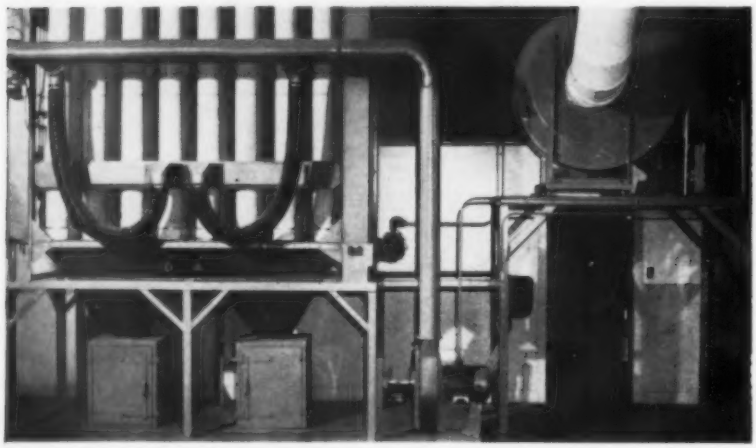
Address_____

City_____ Zone____ State____

Koroseal —T. M. Reg. U.S. Pat. Off.

DAY

DUST CONTROL NEWS



An unhoused DAY "AC" dust filter* operating in work area of a manufacturing plant.

CUT FUEL COSTS—Return clean, warm, filtered air to work area

If you'll investigate, you'll find nearly all dust filters made are available only as **housed units** . . . BUT with DAY "AC" filters, housing is optional. Housed units are necessary when located outside or when placed on suction; UNHOUSED DAY filters can be placed in any convenient plant location. Using DAY UNHOUSED filters means you not only eliminate the cost of filter housing and exhaust piping but cut your fuel bills as well.

DAY "AC" filters are used to clean air in all types of industry . . . for filtering atomic energy dusts and even the air in oxygen manufacturing plants where the elimination of air pollution is most essential. For more information about DAY "AC" dust filters write for Bulletin F-75. It contains useful charts and air engineering data. Write toDAY for your free copy.

*Licensed by H. J. Hersey, Jr.

The **DAY** *Company*

SOLD in UNITED STATES by
The DAY SALES Company
807 Third Ave. N.E., Minneapolis 13, Minn.

MADE and SOLD in CANADA by
The DAY Company of Canada Limited
12 Brydon Dr., Rexdale (Toronto), Ont.

Representatives in Principal Cities

EQUIPMENT ONLY OR A COMPLETE SYSTEM

For more facts circle 595 on Reply Card

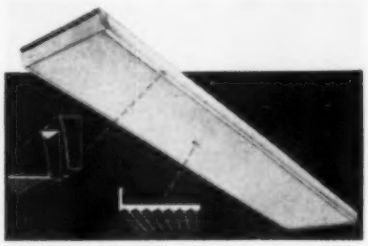
NEW PRODUCTS

(Begins on page 148)

and has excellent resistance to acids, alkalis, petroleum products, water, solvents. Standard kits contain Part A, a pre-mixed aggregate and resin, and Part B, a pre-mixed aggregate and hardener. The two parts are hand mixed with a trowel. H. V. Hardman Co., Inc.

36—LIGHTING FIXTURE features plastic lens

Similar in appearance and construction to company's Catalina, the C-2 incorporates a polystyrene pyramid pattern lens. The lens is chemically fused to the extruded polystyrene



plastic side panels. When installed in continuous lines, the C-2 gives the appearance of a single line of light, in that there are no visible metal frames or braces the full length of the unit. As shown at left, a polyethylene plug closes the ends of the side panels to keep out dust. The one-piece solid plastic basket blends with modern types of architectural treatment and may be installed singly or in continuous lines. Details on this fixture are in Form AD6856. Benjamin Electric Mfg. Co.

37—LUBRICANTS have no odor, taste or color

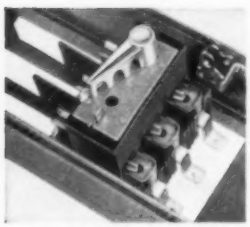
Problems inherent in the lubrication of food and beverage plant equipment can be virtually eliminated through use of these odorless, tasteless, colorless lubricants, it is announced. Nevastane and Vetostane are described as combining exceptional lubricating qualities with near pharmaceutical purity. They contain no whitening agents, oxides or materials used for similar purposes, it is stated, and will not alter taste, purity, appearance or food value of foods with which they come in contact. Nevastane has an average melting point of 250 F and is claimed to resist water, steam, acids, and to take hard steady service. Vetostane has approximately the same properties and characteristics, but has a

For more facts circle 596 on Reply Card ——→

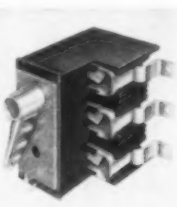
Now QMQB Fusible Switches

- **QUICK-MAKE, QUICK-BREAK**
- **30 THROUGH 1200 AMPS**
- **VISIBLE BLADE CONSTRUCTION**

FOR PANELBOARDS, SWITCHBOARDS, CONTROL CENTERS—heavy-duty design meets modern industry's increased power handling requirements—30 through 1200 amperes, 600 volts—the most complete line available! U.L. approved. For complete information on QMQB units and panelboards, write for bulletin 3-230: Federal Pacific Electric Company, General Offices: Newark, New Jersey.



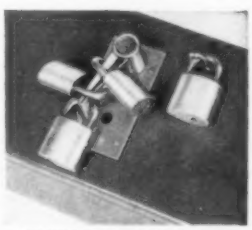
VISIBLE BLADES FOR MAXIMUM SAFETY—Lets you see at a glance whether switch is "ON" or "OFF"—makes inspection easy. Silver-alloy contacts insure positive connections—reduce wattage loss.



INTEGRAL HANDLE MECHANISM FOR GREATER CONVENIENCE—handle mechanism and switch are combined in a single unit—eliminates excess linkage—prevents misalignment and false indication of switch position.

DEIONIZING ARC QUENCHERS FOR COOLER, FASTER INTERRUPTION—eliminate pitting and provide higher interrupting ability. Arc is divided, cooled, and extinguished in the quencher, rather than on the contact surfaces.

HIGH PRESSURE FUSE HOLDERS FOR LONG LIFE, RELIABLE SERVICE—grip the fuses tightly under constant spring pressure—reducing contact resistance for cooler, more efficient switch operation—even under varying loads.



LOCKING PROVISION FOR ADDED SAFETY—cover may be locked in either "ON" or "OFF" position with as many as three full-size padlocks to prevent unauthorized access. Additional provision for padlocking cover.

FEDERAL FPE PACIFIC

The Best in Electrical Distribution and Control Equipment

6 CENTS PER DAY BUYS A LO-HED® HOIST

"Although this hoist is over 32 years old, it is still doing an excellent job. Cost of maintenance is next to nothing. A recent inspection would seem to indicate that the hoist will be good for another 32 years."

Said by John Vengoechea, Maintenance Superintendent, Edgcomb Steel Company, Philadelphia, Pennsylvania, (seen on the left above), talking to Ed Boyer, Sales Manager, A-E's Materials Handling Division.

Lo-Hed Electric Hoists Cost Less Because They Last Longer

Based on current prices, this Lo-Hed Hoist at Edgcomb Steel shows a capital cost of less than 6 cents per day... and it looks like it will still be going strong in 1990.

There's A Lo-Hed Electric Hoist Exactly Right For Your Application

Just give us the details! Lo-Hed's are available with headrooms as low as 11"; capacities ¼ to 12 ton; all control types, two-speed included; 5 suspensions; also adaptable to any crane or monorail system; shrouded bottom block; 2 automatic brakes, anti-friction bearings throughout, full load tested. Look in your classified telephone directory under "A-E Lo-Hed Hoists" for your nearest representative.

For helpful information on hoists, fill out and mail this coupon today.
Please send me a copy of your booklet on:
☐ "How to select the proper hoist to meet your needs."
☐ "Five things to consider before you buy that hoist."

Name.....
Position.....
Company.....
Address.....
City..... Zone.... State.....
H164

DISTRIBUTORS AND AGENTS: Distributorships and agencies for Lo-Hed Electric Hoists are available in many parts of the country. If you are interested, call or write Ed Boyer, Sales Manager, A-E's Materials Handling Division.

AMERICAN ENGINEERING COMPANY
Wheatsheaf Lane and Sepviva Street
Philadelphia 37, Pennsylvania

Branch Offices: Jersey City • Cleveland • Chicago

Canadian Subsidiaries: Affiliated Engineering Corporations, Ltd., Montreal, P.Q. • Bawden Industries Ltd., Toronto, Ontario

AE Products are: Taylor, Perfect Spread and Vibra-Grate Stokers, Hele-Shaw and Hydromite Fluid Power, Lo-Hed Hoists, Lo-Hed Car Pullers, Marine Deck Auxiliaries

For more facts circle 597 on Reply Card

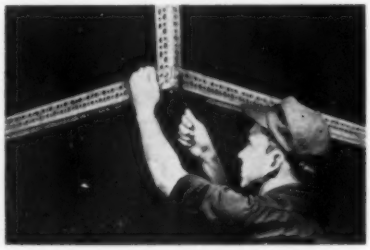
NEW PRODUCTS

(Begins on page 148)

higher melting point and greater durability. In addition, Nevastane is made in a tacky type, while Vetostane is not. These lubricants are made in twelve densities for a variety of conditions, in grease and liquid form. Keystone Lubricating Co.

38—FRAMING ANGLE made of galvanized steel

AIM Brand Slotted Angle has a recurring pattern of slots and holes to facilitate assembly and give structural strength and rigidity. It is designed to provide a variety of structures which can be assembled

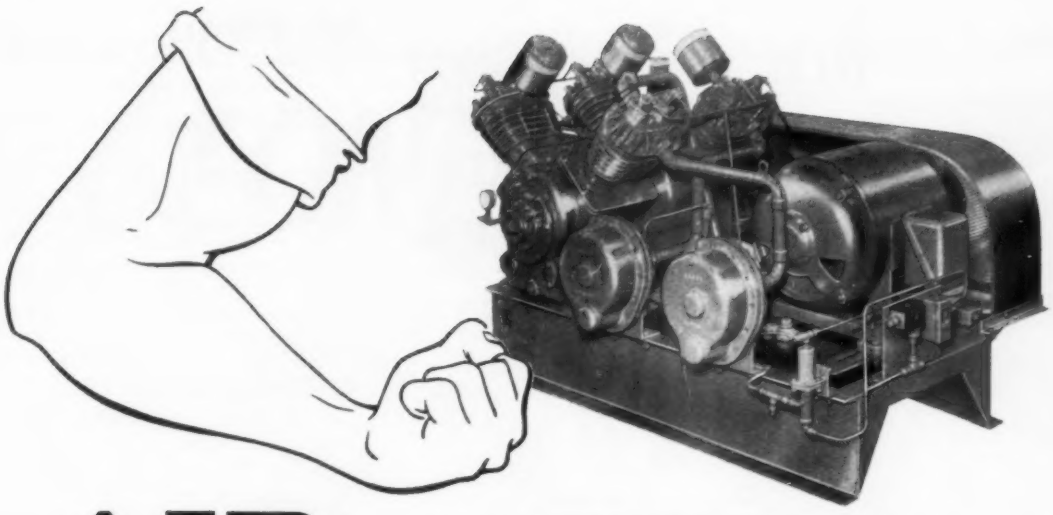


without welding or drilling or need of special skills or tools. Applications for it include mezzanine structures, carts, tables, storage racks. The slot-and-hole pattern also permits formation of two types of joints. Friction-type joints are made by bolting through vertical and horizontal slots. Where load factors require maximum joint strength, lock-joints are formed by bolting through the round holes. The material is reusable. It is made in two sizes: standard, measuring 2¼ by 1½ by 0.080 in., and heavy duty, 3 by 1½ by 0.104 in. Acme Steel Co.

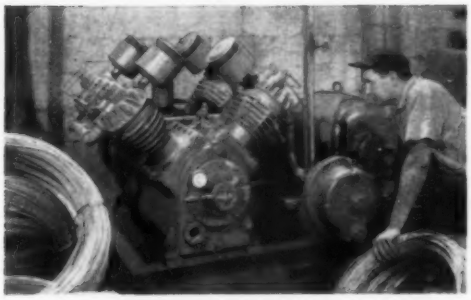
Reader Service Cards on pages 219-220 make it easy to get further information on any of these products. Just circle the item numbers of the products you would like to know more about.

39—LIFT TRUCK, heavy-duty gas-powered unit

The FT 20-24 is powered by a four-cylinder, 133 cu in. heavy-duty engine, delivering 35 bhp at 2400 rpm and available in gasoline or LP-fuel models. Two transmissions are available: standard two-speed constant mesh transmission, or, as optional



AIR: ANOTHER ARM for INDUSTRY



Typical installation at Conver Steel and Wire Company, New York. Used to operate spot welders, benders, paint mixers and for clamping, holding, riveting, etc.

BRUNNER
SINCE 1906

AIR COMPRESSORS

To be of consistent value in industry, compressed air must be generated economically by equipment which assures low installation expense and keeps maintenance costs to a minimum.

The BRUNNER compressor meets every test . . . and, in addition, offers these advantages:

It's furnished in either single stage or two stage—to suit your needs.
It's compact! A complete, packaged unit with water-cooled intercoolers and aftercoolers mounted.
It's a space saver requiring minimum room.
It's versatile! Capacity is economically controlled to meet every variety of air demand.
It's rugged! Continuous oil filtering means less wear, longer life.

Single and two stage base mounted electric motor driven units, complete with controls of your choice. Single stage units offered in 80 or 100 P.S.I. ratings of 25-30-40 and 50 H.P. sizes. Two Stage units offered in 125 or 150 P.S.I. ratings of 25-30-40 and 50 H.P. sizes.

For complete details request Catalog 37.

Heat-X Air Compressor Aftercooler with inner-fin construction provides maximum heat transfer with minimum air pressure drop.
Available in WIA (water-cooled) or RIA (refrigerated) models for compressed air systems from 10 to 1500 CFM.

Request Catalog 8065.

BRUNNER DIVISION
DUNHAM-BUSH, INC.
UTICA, NEW YORK

DUNHAM-BUSH

AIR CONDITIONING • REFRIGERATION • HEATING • HEAT TRANSFER

WEST HARTFORD, CONNECTICUT • MICHIGAN CITY, INDIANA • MARSHALLTOWN, IOWA
RIVERSIDE, CALIFORNIA • BRUNNER DIVISION, UTICA, NEW YORK
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heat-x HEAT-X, INC. WEBSTER, N.Y. · BRUNNER THE BRUNNER CO. GAINESVILLE, GA. · DUNHAM-BUSH DUNHAM-BUSH (CANADA) LTD. TORONTO, CANADA
DUNHAM-BUSH DUNHAM-BUSH, LTD. LONDON, ENGLAND · BRUNNER BRUNNER CORPORATION (CANADA) LTD. PORT HOPE, ONTARIO

For more facts circle 598 on Reply Card

NEW Snap-on MAGNETIC SOCKETS last ten times longer — give re-usable magnet bonus

Cutaway view showing socket, magnet, self-tapping screw. *Snap-on* magnetic sockets are available in the following sizes: ¼-in. drive for ¼, 5/16, 3/8-in. sockets; 3/8-in. drive for 5/16, 3/8, 7/16, ½-in. sockets, ½-in. drive for 7/16, ½-in. sockets.

On actual customer test, this newly developed socket drove 112,320 self-tapping screws. A similar competitive socket, priced only about 30 cents less, wore out after driving only 10,530 screws. Both sockets were subjected to identical conditions.

Figure what *you* can save by switching to these new *Snap-on* sockets — in replacement cost — and in assembly line downtime, too.

and here's an Extra Bonus . . . re-use your magnets — save up to 50%

In addition to far greater life, this socket is available without the magnet. You simply tap or press the magnet out of the worn-out socket — insert it in the new one. You save 50 percent on the cost of a complete magnet socket. *Snap-on* has developed an inexpensive tool that inserts the magnet to exactly the right depth.

This is an example of *Snap-on* research and development that helps industry save time and money. Your *Snap-on* industrial tool specialist can show you many more. Branch offices and warehouses are conveniently located in 58 major cities throughout the U.S. and Canada.

To remove magnet, simply tap it out of the socket with an appropriate punch.

To re-insert, just tap magnet into socket with *Snap-on* assembly punch. The entire operation takes about a minute.

SNAP-ON TOOLS CORPORATION
8068-K 28th Avenue • Kenosha, Wisconsin

For more facts circle 599 on Reply Card

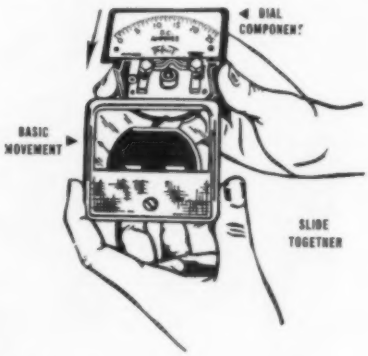
NEW PRODUCTS

(Begins on page 148)

equipment, torque converter drive. The "extra-lift" mast, standard equipment, gives a maximum stacking height of 131¼ in., overall lowered height of 83 in. and free lift of 16¼ in. For easy maneuverability in narrow plant aisle, the new truck's overall width is 32 in. and outside turning radius, 62 in. Allis-Chalmers Mfg. Co.

40—PANEL METERS offer flexibility of application

The Unimeter affords a means of having a variety of panel meters at low cost, combining any number of dial component sections with a separate basic movement section. Since



the basic movement accounts for the greater part of the meter cost, this development permits stocking of the minimum number of basic meter movements and a maximum quantity of varied inexpensive dial components, it is noted. To assemble, you simply slide the two sections together, lock with thumbscrew. The Triplett Electrical Instrument Co.

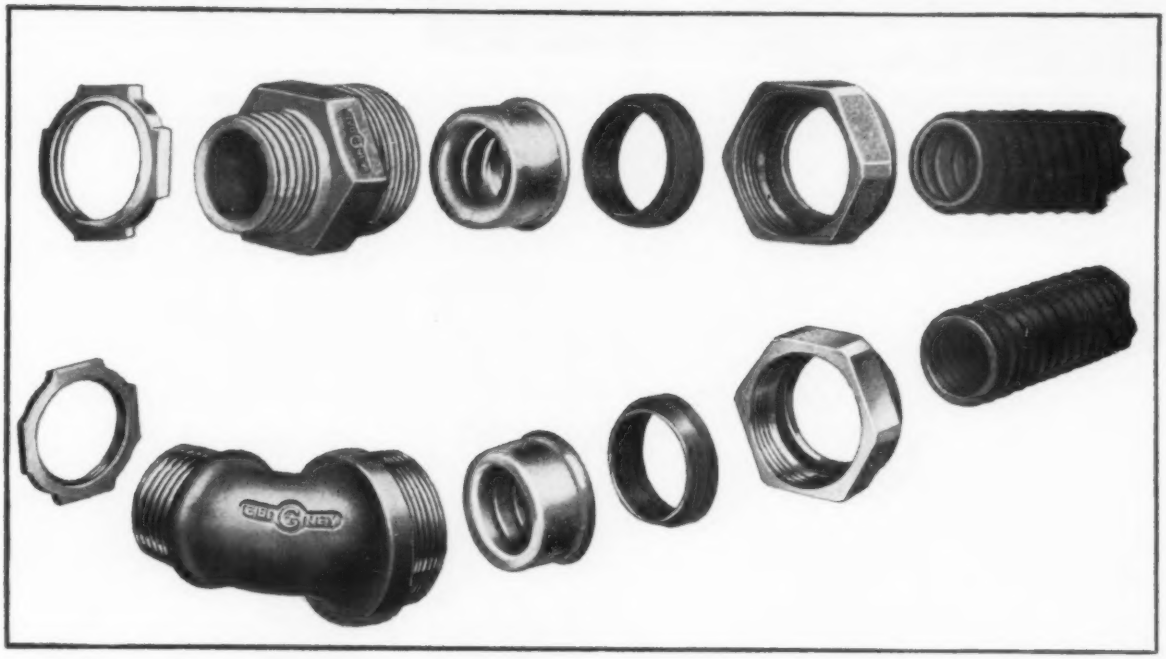
41—SEALANT adjusts to expansion, contraction

Stonlast, a resilient material, is reported to form permanently weathertight seals for cracks and joints in concrete, brick, metal, wood, and other building materials. With minor limitations Stonlast will seal "anything to anything," according to manufacturer, and the secret of its long-lasting qualities is its foam-rubber-like resiliency which enables it to "give" with expansion and stretch with contraction while adhering to the base material. It is claimed unaffected by temperature changes from —50 to 200 F.

A formulated synthetic rubber compound, Stonlast doesn't contain

For absolutely Liquid-Tite Connectors specify

GEDNEY— every time!



THESE ARE THE NEWEST, most efficient liquid-tite connectors available today for use with Sealtite* and equivalent liquid-tite conduits. Designed to give wiring installations absolutely dependable protection in these popular oil- and water-tight flexible raceways, Gedney Liquid-Tite Connectors are built for lifetime service.

As shown from left to right in the exploded views above, Gedney Liquid-Tite Connectors consist of:

1. **Locknut—nut stock steel—cadmium-plated**
2. **Main Fitting—straight, 90° angle, or 45° angle—malleable iron—cadmium-plated**
3. **Grounding Bushing—one piece—threaded to engage conduit spiral**
4. **Molded Vinylite sealing ring—pliable—ever-lasting**
5. **Gland Nut—malleable iron—cadmium-plated**

Standard sizes range from ⅜" to 2" straight, 45° and 90° . . . order Gedney Liquid-Tite Connectors for top safety and longest life.

* *Sealtite is the trade name of American Metal Hose Branch of the American Brass Company*

GEDNEY FITTINGS FIT!

GEDNEY
ELECTRIC COMPANY

GEDNEY

RKO BLDG., RADIO CITY, NEW YORK 20
Foundry, Factory and Shipping Point: Terryville, Conn.

For more facts circle 600 on Reply Card

localized wear...

is this your wire rope problem?

FREE Red Strand Bulletin No. 106 tells how to lengthen wire rope service life when greatest wear is in specific areas

Why is it that wire rope is often severely damaged near one or both ends while the rest of it is perfectly sound? Obviously, you can't afford to discard the whole rope. So, what can you do to correct or compensate for this condition? These and related questions are fully answered in Service Bulletin No. 106, one of a series designed to help users get more efficient, more economical service from wire rope. Copies are sent free. Write H. K. Porter Company, Inc., Leschen Wire Rope Division, 2727 Hamilton Avenue, St. Louis 12, Missouri.

LESCHEN
Red-Strand
WIRE ROPE

H. K. PORTER COMPANY, INC.
LESCHEN WIRE ROPE DIVISION

For more facts circle 601 on Reply Card

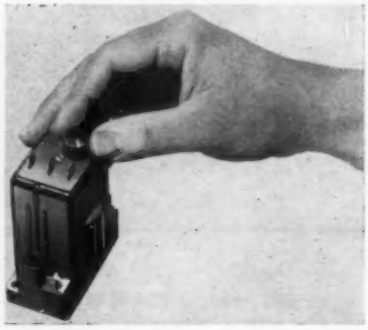
NEW PRODUCTS

(Begins on page 148)

oils, manufacturer states; it doesn't oxidize and become brittle and is not deteriorated by most corrosive vapors. It comes packed as two component fluid pastes, a base resin and curing agent, to be combined at the job site. At 75 F the mixture remains workable for 2½ to 3½ hr, and cures in 33 to 39 hr. It is available in a heavy-body form to be applied by trowel, knife, or caulking gun, or in pourable form; both come in black, gray and aluminum colors. Stonhard Co., Inc.

42—TIME DELAY RELAY has transistorized control

Trans-O-Netic is a transistorized time-delay relay employing an electronic timing system to achieve fast switching action, instantaneous reset, high timing accuracy and full reproducibility of the time-delay



period even during rapid recycling. It uses a transistorized control circuit and an R-C network—the latter serving only as a time pilot for the control circuit which, in turn, operates a high-speed electro-mechanical switching unit. Quantity lots of the Trans-O-Netic are claimed accurate to within ±10 per cent of the specified time delay, and temperature effects negligible over operating range of zero to 130 F. The relay is available with either fixed or adjustable time delay period of 1.5 to 30 sec. Switching action is single-pole, double-throw. Models are presently available for operating on 12 v d-c. Bulletin 5300 gives full information. Heinemann Electric Co.

43—TEMPERATURE SENSOR for rotating machinery

Model S-3 features a non-inductive bifilar-wound resistance element which is also insensitive to strain gage effect. Three high-temperature insulated leads are provided for

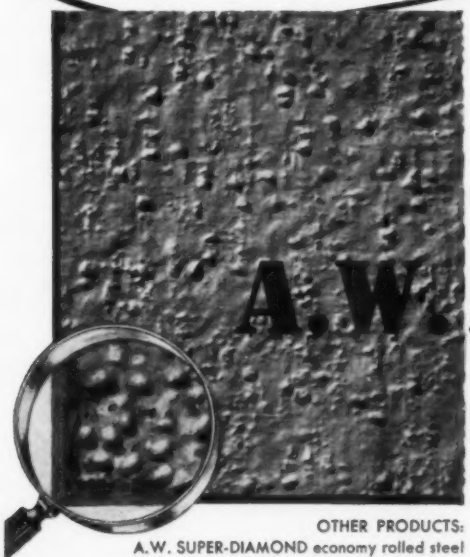
Since he installed A.W. ALGRIP his feet haven't slipped off once!

The absolute answer to a major "Boss' Son" problem. Prevents that spine shattering jar when your heels hit the floor, or loud "thuds" that wake up secretaries. In fact your heels can't slip!

But if you're a smart "Boss' Son", you'll think of other ways to use A.W. ALGRIP that increase plant safety . . . good will . . . production! You'll find that A.W. ALGRIP helps you reduce Accident Insurance costs at the same time.

A.W. ALGRIP Rolled Steel Floor Plate is made by a patented process in which a grinding wheel type abrasive is rolled—*not coated*—to a controlled depth, as an integral part of tough steel plate. Wear merely exposes more abrasive . . . safety lasts for the life of the installation.

Check your plant for areas where slipping hazards may exist. A.W. ALGRIP provides super-safe footing under the most hazardous slipping conditions—even on inclined surfaces. Send the coupon for A.W. ALGRIP information, today.



A.W. ALGRIP ABRASIVE ROLLED STEEL FLOOR PLATE

ALGRIP—*approved for safety by Underwriters' Laboratories*

ALAN WOOD STEEL COMPANY
Conshohocken, Pa.

Please send A.W. ALGRIP Booklet AL-E29

Name_____

Title_____

Company_____

Address_____

City_____ Zone_____ State_____

OTHER PRODUCTS:
A.W. SUPER-DIAMOND economy rolled steel floor plate—Plates—Hot and cold rolled sheet and strip—(Alloy and Special Grades)

For more facts circle 602 on Reply Card

NEW PRODUCTS

(Begins on page 148)

bridge circuit connections independent of lead wire resistance. Encased in epoxy-glass laminate, sensor is described as exceptionally rugged, able to operate in temperature ambients of —55 to 150 C for unlimited time. Sensor resistance element is standard 10-ohm, plus or minus 0.02 ohms at 25 C, with a change in resistance of 0.00385 ohms per ohm per degree C. Measuring 0.078 in. in thickness, sensor is available in various widths and lengths. Minco Products, Inc.

44—PASTE CLEANSER comes in handy aerosol can

Vi-Lan, a waterless, antiseptic paste cleanser, is now offered in an aerosol can. According to manufacturer, Vi-Lan may be used on any part of the body for safe removal of heavy foreign soils, such as paint, tar, creosote, asphalt, grease and rubber cement, from cuts, sores, lacerations, burns and suture wounds—also adhesive left on the skin from adhesive tape. It is rinsed off with water. Dameron Enterprises, Inc.

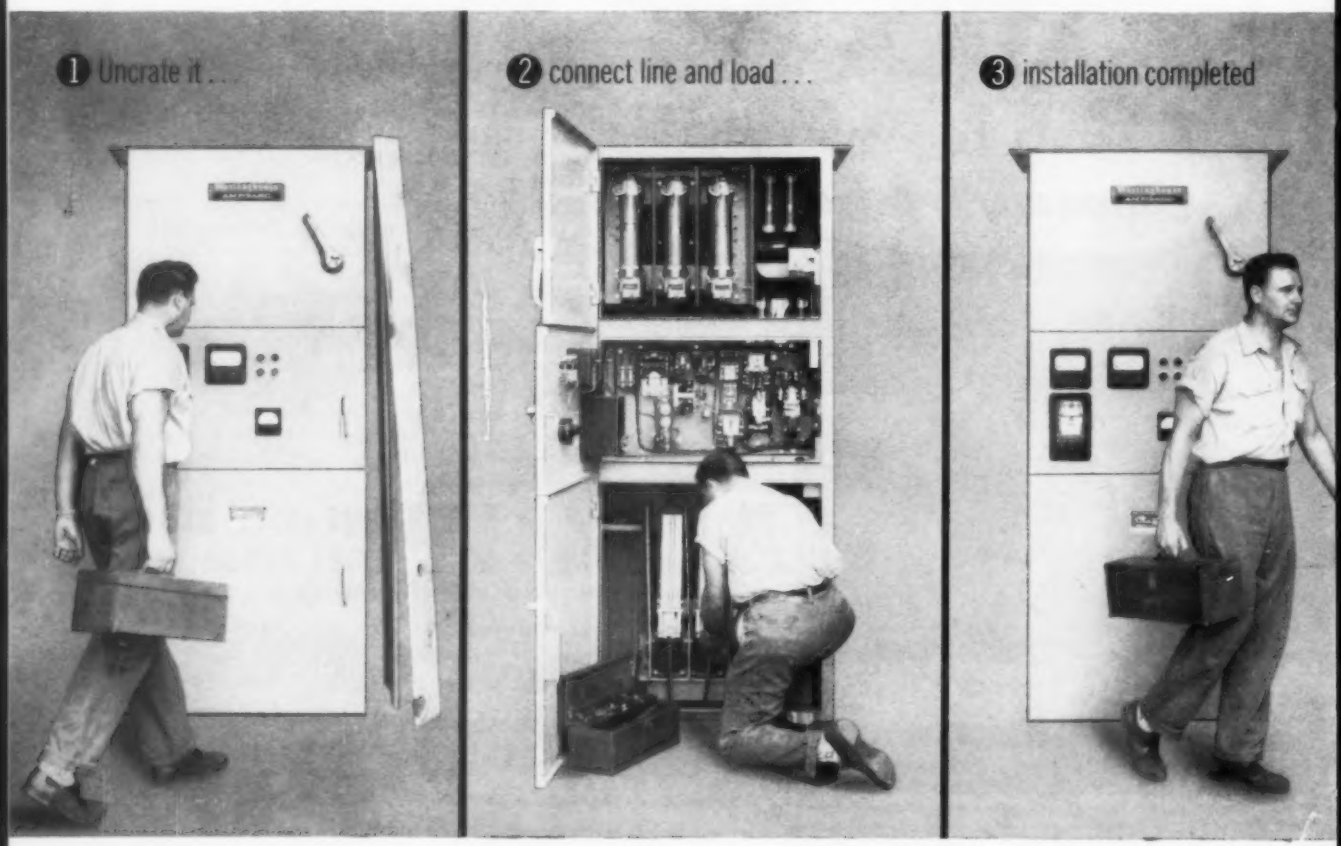
45—MOVABLE WALLS can be installed economically

Singline Partitions can be installed at an original cost comparable to that of plaster and similar conventional walls, manufacturer states. This partitioning system has 3-in. flush panels which form just one line at the joints. The 4-in. high base and tight-fitting ceiling trim afford simple decorative lines. Features common to premium-type metal partitions are incorporated in Singline Partitions, including panels that are reusable and interchangeable, built-in base and cornice wiring facilities, and Fiberglas insulation packed between panel walls to provide improved sound control qualities.

Other Singline construction items include concealed posts or slender 2½-in. posts for steel and glass installations, self-seating integral glass molding and double-cam interlocking floor connections to permit adjustments on uneven floors. There are no visible fastenings, or gaps, it is noted. All-steel panels come in standard widths from 6 to 48 in. Combination steel and glass panels range from 12 to 60 in. wide. Basic heights are 7 ft 3¾ in., 8 ft 6 in., and 9 ft. Partitions are enameled in a variety of colors. The Mills Co.

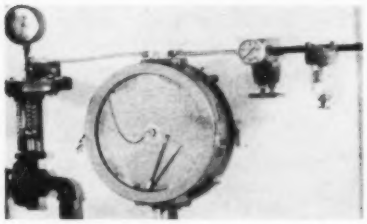
46—GALVANIZED RACKS for outdoor storage

The entire line of adjustable storage racks and bulk bins manufactured by this company is now offered with a hot-dipped galvanized finish, resistant to corrosion and salt solutions. The coating is designed to make racks suited for outdoor storage, for refrigeration and cooler rooms, and for use in coastal regions or in any wet climate. Models are available with loading capacities up to 8000 lb per shelf. Sturdi-Bilt, Material Handling Div., Union Asbestos & Rubber Co.



47—TEMPERATURE CONTROL is low-cost recording type

This new recording temperature controller is designed to utilize a 15-lb air line to actuate an air-operated steam valve or other air-operated device. It is available in any of 10 optional temperature ranges within the extremes of –30 to 1100 F. It features a 10-in. circular chart,



electric or spring driven, for 24 to 48-hr or 7-day periods. A feature is an adjustable throttling range, 3 to 20 per cent. The instrument is actuated by a mercury-filled thermal element. The control varies the air pressure between the control and the air operated valve in direct proportion to temperature changes. A rise in temperature at the point being controlled is sensed by the control which modulates the air pressure to the air-operated valve or device. Depending on the degree to which the heat has risen, the valve will restrict the supply of heating medium. A fail-safe provision is incorporated to shut the valve off completely if there is a failure in air supply to the instrument. Specifications are in Bulletin 242. The Partlow Corp.

48—CONTROL for tube rolling, in two sizes

Depending on the size of the tube rolling job, either the standard or heavy-duty models of this air magnetic control may be used. The standard control, weighing only 10 lb, features a pistol grip with squeeze trigger. It is only 10¼ in. long and has a motor speed of 1000 rpm. The heavy-duty control, weighing 12½ lb, is controlled by a valve handle at the rear. Both models are advantageous for tube rolling in hazardous locations, it is pointed out, and they are not affected by fluctuations in the motivating air. Bulletin Y-53 provides data. Elliott Co.

49—SOLENOID VALVE is compact in size

An all-purpose two-way solenoid valve, the Shorty is compact in size, as its name implies—4¾ in. high by 3 in. wide with height from top to line only 3-13/16 in. Of cast bronze, Shorty is low priced and its applications include air and gases to 250 psi, water to 150, oil to 75 psi, and steam to 25 psi. Pilot-operated, the valve can be kept open with a pressure differential of only 5 psi. Features announced include stainless steel pilot, unbreakable stick-free piston rings, and replaceable resilient seats. Bulletin KK-160 gives details. Atkomatic Valve Co., Inc.

One of these products may be "just what you're looking for." Use the handy Reader Service Cards to ask for more information on it.

50—CONTACT CEMENT for structural applications

Instant-Lok 4300 is introduced as a non-flammable, water-thinned adhesive capable of giving high strength bonds between glass, hardboard, metal, decorative high pressure plastics and wood surfaces. Possessing instant bonding properties usually associated with solvent based sys-

Westinghouse *AMPGARD* high-voltage starters . . . completely factory wired . . . shipped in one package . . . easily installed

Specify Westinghouse AMPGARD* high-voltage starters and you automatically reduce installation time and expense. Why? . . . Your Westinghouse high-voltage starter arrives completely ready for operation . . . it's all wired, completely assembled and pretested. No need to wire and assemble separate contactor units. Just make the line and load connections and you're in business.

Available for squirrel-cage, wound-rotor and synchronous motors up to 5000 volts, Westinghouse AMPGARD high-voltage starters simplify and reduce future maintenance . . . contactors are completely serviceable without removal from the starter . . . tilt-out arc chutes of Type H stationary contactor permit immediate inspection of all essential parts . . . contacts can be replaced in minutes.

For complete information about new Westinghouse AMPGARD high-voltage starters, contact your nearby Westinghouse representative, or write: Westinghouse Electric Corporation, P.O. Box 868, 3 Gateway Center, Pittsburgh 30, Pennsylvania. J-22138

*Trade-Mark

POWER-UP starts with CONTROL

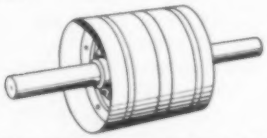
YOU CAN BE SURE...IF IT'S Westinghouse

For more facts circle 603 on Reply Card

STEARNS
Indox V Magnetic Separators

THE LOWEST COST, MOST EFFICIENT TRAMP IRON STOPPERS ON THE MARKET TODAY!

First to take advantage of the remarkable magnetic properties and money-saving features of Indox V is Stearns—the leader in design and development of magnetic equipment for more than 40 years. *Only Stearns uses Indox V* in magnetic tramp-iron separation equipment. Here are four brand new Stearns separators that are introducing a new era of tramp-iron protection for all industry.

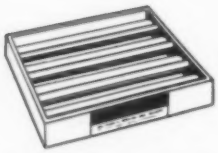


NEW INDOX V MAGNETIC PULLEY

Installed at head of belt conveyor system, outperforms conventional permanent magnet pulleys, equals deep-field power of electromagnetic types. Radial design boosts holding efficiency for maximum separation. Standard widths and diameters to match your present system. Ask for Bulletin No. 1021-T.

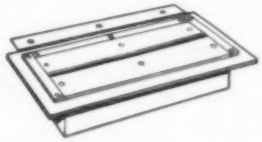
NEW INDOX V MAGNETIC DRUM

An ideal unit for process industries where granular materials are conveyed in enclosed chutes or spouts. Revolving stainless steel cylinder inside a welded steel housing carries material over stationary magnet assembly, which holds iron particles beyond discharge of non-magnetic product. Indox V produces exceptionally uniform field *30 to 40 percent stronger* than old-style permanent magnet drums. Complete range of types and sizes for any installation. Write for Bulletin No. 1051-T.



NEW INDOX GRATE MAGNET

Easily installed in any hopper or floor opening, chute or duct, guards your product and plant against dangerous tramp iron. Collecting tubes, with continuous magnetic poles along their entire length, leave no "dead" spots. Effective area is actually 400 percent greater than in ordinary grate magnets! Complete range of types and sizes for any installation. Bulletin No. 1072-T.



NEW INDOX V PLATE MAGNET

Provides separating efficiency far superior to ordinary plate magnets. Powerful, uniform magnetic field traps iron particles in flowing material in chutes, ducts, spouts or on conveyors. Excellent tramp-iron protection at low cost. Write for Bulletin No. 1073-T.

WHAT IS INDOX V?

Indox V is a highly oriented barium ferrite ceramic material. Its energy is comparable, on an equivalent weight basis, to that of Alnico V — the most powerful permanent magnet material available. Indox V magnets possess unique advantages — light weight, high electrical resistivity, great resistance to demagnetization, inexpensive, non-critical raw materials—plus an energy product over three times that of non-oriented ceramic magnets. Indox V is used in separators manufactured by Stearns exclusively.

STEARNS MAGNETIC PRODUCTS

A DIVISION OF THE INDIANA STEEL PRODUCTS COMPANY

635 SOUTH 28TH STREET • MILWAUKEE 46, WISCONSIN

For more facts circle 604 on Reply Card

NEW PRODUCTS

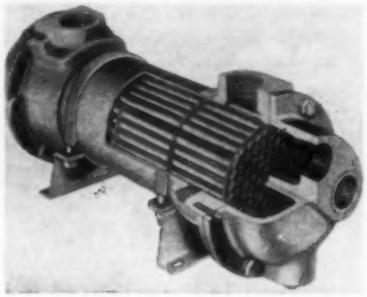
(Begins on page 148)

tems, Instant-Lok 4300 offers both safety advantages and savings in equipment costs, company announces. It is pointed out that utilization of this material eliminates need for ventilating hoods.

This contact cement can be sprayed, brushed or roller coated on surfaces and its instant bonding feature permits rapid assembly line production. For room temperature application, Instant-Lok 4300's extended open assembly time allows versatility in adapting the material to various manufacturing techniques. It can be heat reactivated where combining is not done the same day as coating. Structural Products Div., National Starch Products Inc.

51—HEAT EXCHANGERS feature improved shell

Perfexchangers are standard stock heat exchangers, in sizes from 1.3 to 200 sq ft of surface. The unit is described as an improved type of shell-



and-tube heat exchanger. Its design prevents bypass around the tube bundle, increasing efficiency 10 to 15 per cent, according to company; and optimum clearance between tubes, shell and baffles, together with better tube spacing, further increases efficiency. An added feature is the universal mounting bracket which is detachable and rotatable 360 deg. Perfexchangers come in single-, two- and four-pass models. Brochure 5801-X describes them. Perfex Corp.

52—SCANNER can monitor as many as 24 stations

With this scanning control as many as 24 stations may be monitored in sequence, any abnormal condition being instantly indicated by a red light on the control and by an alarm, if desired. In addition, the equipment being monitored may be shut down. Although developed for monitoring temperatures from —200 to

What this tag on OKOCORD portable cords and cables means to you

This "QC" (Quality Control) tag, the final one of a series, is Standard Operating Procedure for every length of OKOCORD **before** it is shipped out to you. It's your assurance that Okonite's modern equipment, skilled craftsmanship and overall Quality Control program combine to build more **value** into OKOCORD portable cords and cables.

Here are six other steps, typical of all OKOCORD manufacturing operations, where quality is constantly checked and maintained by the Quality Control Lab and every operator and supervisor in the plant.

1. **QC Lab tests copper rod, raw materials against Research-developed standards to maintain uniform, high quality.**
2. **Strands are continuously drawn, annealed and steam cleaned with every run passed for size, strength, flexibility.**
3. **Compounds are mixed, milled, strained and refined in a continuous mechanized sequence to help eliminate error.**
4. **Microscopic examination of compound batches, in addition to physical and electrical tests, checks particle dispersion and authenticates compounding.**
5. **Latest type of continuous lead extruder eliminates damaging press stops in applying continuous mold for vulcanization—guarantee of OKOCORD's "tire-tread" toughness.**
6. **Okonite QC imposes the most rigorous tests in the industry, in process and final.**

Each reel of OKOCORD bears this quality control tag. It's your assurance that the OKOCORD you buy will be a long-term investment. The Okonite Company, Passaic, N. J.

Buy through your distributor.

Write for this newly-published 64-page catalog on OKOCORD. Full information on construction components, cable assemblies, dimensional tables, engineering data plus splicing and terminating drawings and instructions.

where there's electrical power . . . there's **OKONITE CABLE**

6379

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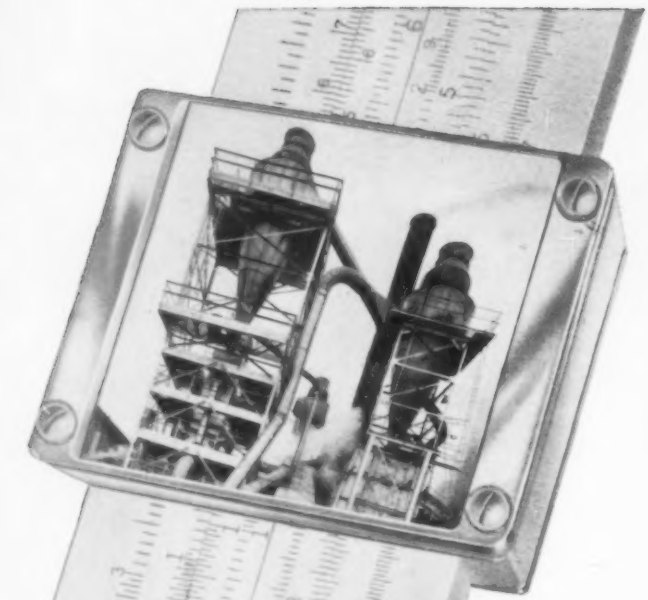


Dust Control is a job for Engineers

The "rule of thumb" methods of the inexperienced, or the "engineering rules" of an experienced design, fabrication, and installation firm—which will you select for your dust control problems?

Kirk and Blum offers you . . .

ENGINEERING—a staff of qualified engineers with proven ability to solve your dust control problems.

RESEARCH—continuous research on full scale equipment, to develop the most efficient systems.

EXPERIENCE—over 50 years of dust control service to the woodworking industry.

Every Kirk & Blum installation is based on a complete service: Design — Fabrication — Installation, backed by K & B's acceptance of One Undivided Responsibility for the system to assure your satisfaction.

On your dust control problem consult Kirk and Blum, craftsmen in dust control for the woodworking industry, where fine craftsmanship is appreciated. The Kirk & Blum Manufacturing Company, 3189 Forrer St., Cincinnati 9, Ohio.

KIRK & BLUM DUST CONTROL SYSTEMS

For more facts circle 606 on Reply Card

NEW PRODUCTS

(Begins on page 148)

3000 F, the scanner will provide similar protection with most other measurable variables. The only restriction is that all stations have the same permissible limits of condition being monitored. High or low limits, or both, are set on a single meter-relay. A selector switch checks stations in order, 12 per minute. Signals from thermocouples or other sources are indicated continuously or by moving pointer of the meter-relay. The alarm is sounded if the indicating pointer touches a limit pointer. It is noted that since only one meter-relay is used, the scanner is generally more economical than many controls for essentially same purpose. Assembly Products, Inc.

53—CABLE JACKET can stand high temperatures

Thermazip is announced as an easily applied cable jacket which will withstand 2000 F continuous operating temperatures and 3000 F for brief

periods. Of aluminized reflective asbestos fiber, Thermazip is closed by a plastic or metal zipper track stitched to the fiber with high temperature Teflon thread. An external flap is supplied to protect the track and provide a neat appearing jacket. In addition to its use as a protective cover over cables and components, Thermazip may be zipped over hoses, cables, etc. where flame or sparks are present. Sizes range from $\frac{3}{8}$-in. ID up. The Zippertubing Co.

54—GAS VALVE LUBE is high temperature grease

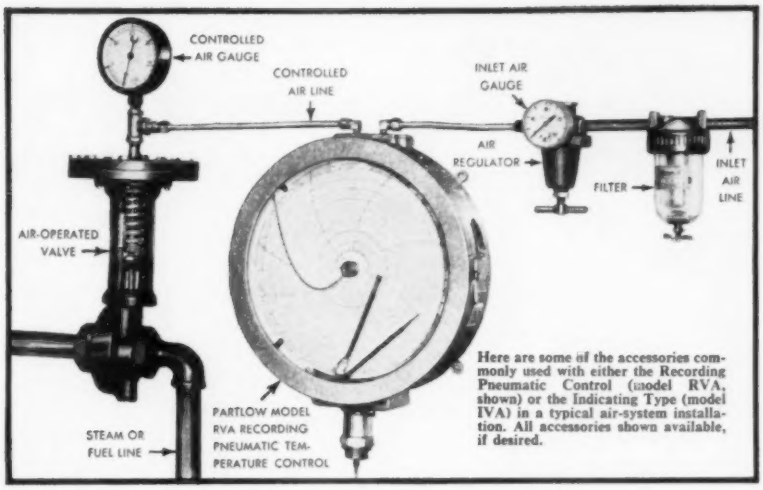
Molykote Type 1102 is described as a high-temperature, non-melting-point grease fortified with molybdenum disulfide powder. It is suggested for use as a lubricant for plug cocks of metal, plastics or glass on equipment where reliable lubrication in the presence of gases or liquids is required. It is claimed to eliminate gumming formations. According to manufacturer this lubri-

Introducing . . .

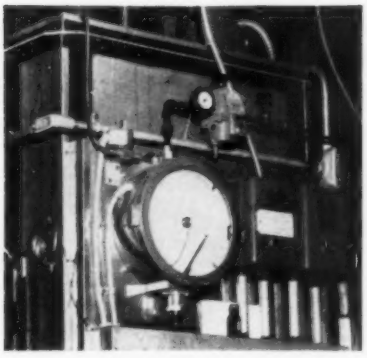
the NEW Partlow Pneumatic Control

New from Partlow . . . throttling-type pneumatic controls engineered to function with extreme accuracy, and sensitivity, under virtually *any* operating conditions.

Actuated as they are by the powerful, direct action of mercury, the Partlow pneumatics actually contain *fewer parts than any other pneumatic control on the market* . . . one reason why they're . . . . **Simpler to install • Simpler to maintain • Simpler to operate • Simpler to replace • and longer lasting, too.**

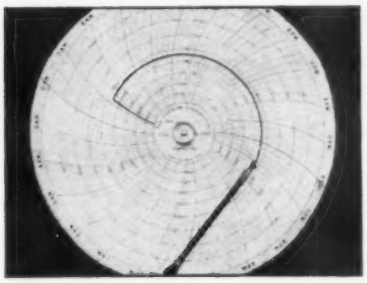


Here are some of the accessories commonly used with either the Recording Pneumatic Control (model RVA, shown) or the Indicating Type (model IVA) in a typical air-system installation. All accessories shown available, if desired.



MODEL RVA

Pneumatic Recording control, installed on new steam-heated cross-flow dryer built by Lydon Bros., Hackensack, N. J.



INSTANT RESPONSE

to temperature changes is a key feature of the Partlow pneumatic. Built-in bulb sensitivity teamed with advanced mechanism design means a minimum of saw-toothing on start-up and a fine line of control when the instrument has reached its throttling equilibrium.

OUTSTANDING FOR ACCURACY, SENSITIVITY AND FLEXIBILITY

The new Partlow pneumatic controls are accurate to within 1% of scale in any one of 10 ranges from -30° to 1100°F. *Exceptionally sensitive too* . . . providing positive, hair-trigger response even to fractional changes in temperature. *And flexible* . . . with throttling range adjustable anywhere from 3 to 20% of scale range.

COST LESS TO OWN AND OPERATE . . CUT "DOWN TIME" TO A MINIMUM!

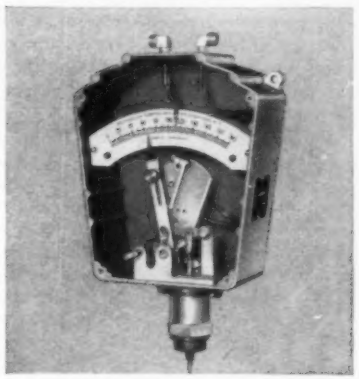
Because they contain fewer parts, Partlow pneumatic controls cost less to buy: next to nothing to operate and maintain. *All elements of the same range are interchangeable*, which means they can be replaced right on the job instead of back in the factory . . . 'Down time' is reduced to a matter of minutes. And no expensive inventory of spare parts or spare instruments is ever required.

IDEAL FOR HAZARDOUS OR 'SHOCK' LOCATIONS!

There are no delicate electronic tubes or gadgets in the Partlow pneumatic to get out of kilter, or possibly trigger an explosion. Its ruggedly simple internal mechanism is virtually shock-and vibration-proof . . provides maximum resistance to moisture, fumes, acid and all types of corrosion. Long-life and trouble-free performance are hallmarks of the pneumatics, as they are of all Partlow controls.

EXCEPTIONALLY VERSATILE TOO!

Both pneumatics — the Recording and the Indicating models — can be used in systems regulating the flow of steam, water or gas . . . or controlling other air-operated devices. Whatever the nature of the heating appliance it actuates, the chances are there's a Partlow pneumatic control to fit your requirements dependably . . . economically . . . *precisely*.



MODEL IVA (interior view)

New Partlow Pneumatic Indicating Control, with throttling range adjustable from 3 to 20%.

SEND US YOUR SPECIFICATIONS

Ask today for a control recommendation tailored for your specific requirements. Of course, if desired, you may field-test this superb new control without cost or obligation. For details write, wire or phone Dept. PE-1158.

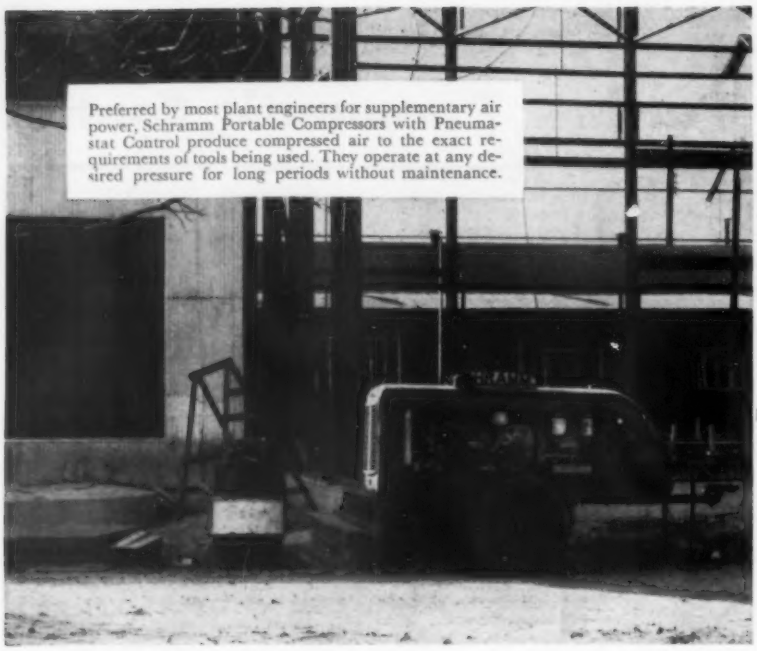
The Partlow Corp., New Hartford, N. Y.

You can pay more but you can't buy better than

PARTLOW

TEMPERATURE CONTROLS

For more facts circle 607 on Reply Card



Preferred by most plant engineers for supplementary air power, Schramm Portable Compressors with Pneumastat Control produce compressed air to the exact requirements of tools being used. They operate at any desired pressure for long periods without maintenance.

SCHRAMM PORTABLE COMPRESSORS PROVIDE . . .

Stand-by air power

Schramm Portable Air Compressors offer valuable insurance for any industrial air system. When emergencies occur, supplementary air can be towed right to the spot to put you back in operation. Lost time is practically eliminated and capital investment is kept to a minimum.

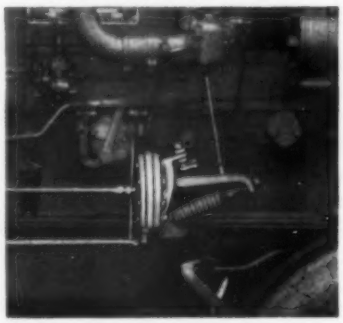
Portable compressors don't stand idle when waiting for trouble . . . there are 101 other jobs for portable air around the plant. Maintenance jobs—inside the plant and out—constantly demand air, as well as air-powered jobs in temporary locations. And when deciding upon the right amount of air for a new job, try using portable compressors—you'll like their flexibility.

You'll also find Schramm Compressors lower in cost than most portables and more economical to run. Schramm engines operate at a conservative rating for long life, instead of being overspeeded to 1800 or 2100 rpm. *Result:* economical operation over long periods without maintenance.

Full details of Schramm Portable Compressors ranging from 125 to 600 cfm—most often used for plant operation—are yours for the asking. Write for Catalog SPB-58 or see your local Schramm Dealer.

See the Yellow Pages for local Sales, Service and Rental of Schramm Air Compressors.

A self-propelled source of air power is the Schramm Heavy Pneumatractor. Drives to the job . . . is ideal for maintenance work. Has tractor features *plus* 125 cfm of air.



The Schramm Pneumastat, watchdog of your compressor, is an exclusive patented air-delivery regulator. It assures full rated capacity at all times. Saves up to 50% in fuel costs.

Schramm, Inc.

MANUFACTURERS OF AIR COMPRESSORS

665 North Garfield Ave. • West Chester, Pa.

For more facts circle 608 on Reply Card

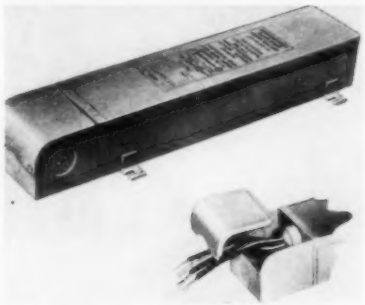
NEW PRODUCTS

(Begins on page 148)

cant is resistant to propane, butane, natural and manufactured gas; ethyl and methyl alcohols; dilute solutions of potassium hydroxide, sodium hydroxide and nitric acid; concentrated hydrochloric acid; boiling water and steam. It is attacked by aliphatic, aromatic and chlorinated hydrocarbons such as gasoline, diesel oil, benzene, petroleum, toluol, xyol, trichloroethylene esters and others. The Alpha-Molykote Corp.

55—FLUORESCENT BALLAST for outdoor service

The entire case of the Nor'easter is hot-dip galvanized for corrosion resistance and, after ballast assembly, the seams of the lid are brazed to form a completely sealed unit. Company's Aqualift Sealant is used to keep moisture from entering through



the pipe nipple where the leads exit and the Neoprene leads are said to withstand exposure to weather and temperature changes without deterioration. According to manufacturer, this is the first completely weatherproof fluorescent ballast, and it can be mounted in any position. The wiring compartment is open on two sides so conduit locks may be easily secured, and four knockouts are provided, so conduit can be brought through either side, bottom or end of ballast. Models are available for 800-, 1400- and 1500-ma lamps. Jefferson Electric Co.

56—POWER DRIVE, for lift trucks, pedal controlled

Towmostatic Drive, offered on this manufacturer's lift trucks, is a method of power transmission based on the principle of hydrostatics. It enables operators to control forward and reverse movement with a treadle-type pedal operated by the left foot, says manufacturer—a simple heel-and-toe action. This drive is designed to provide instantaneous

Change motors in minutes—

with FALK *all-steel* MOTOREDUCERS

No long and costly "down time" involved

Motors can be interchanged or replaced *in minutes* with the all-steel, All-Motor type FALK Motoreducer. No long and costly "down time" is involved in making the change!

Best of all, replacement is not limited to original make of motor—new NEMA frames may be substituted for old. This versatile Motoreducer operates with any make, speed or type of standard foot-mounted motor within its AGMA rating. No modification, no special shaft, no "partial" motor required.

In addition to unmatched motor interchangeability, this dependable gear drive—the "work horse of industry"—offers: widest choice of output-shaft position (horizontal, vertical, right-angle)...any output-shaft connection...any mounting, including wall and ceiling...standard speed range from 1.5 rpm to 1430 rpm. All these advantages, plus proved efficiency, low maintenance and extra-long life, make the All-Motor type FALK Motoreducer your best buy for any job requirement.

Furnished in sizes up to 75 hp with any make, style or type of motor; or, *without a motor if desired.* FALK Motoreducers are available from convenient factory, field or distributor stocks, from coast to coast.

Write for Bulletin 3100

THE FALK CORPORATION, MILWAUKEE, WISCONSIN

MANUFACTURERS OF:

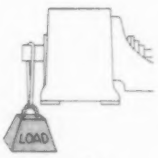
- Motoreducers
- Speed Reducers
- Flexible Couplings
- Shaft Mounted Drives
- High Speed Drives
- Special Gear Drives
- Single Helical Gears
- Herringbone Gears
- Marine Drives
- Steel Castings
- Weldments
- Contract Machining

FALK

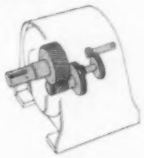
...a good name in industry

FALK "IN-BUILT" FACTORS assure full dependability—better service—longer life

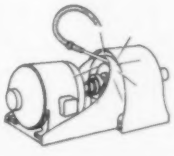
ALL-STEEL HOUSINGS
Rugged, strong, rigid ...all parts heavy steel plate, formed and welded in the Falk Weld Shop.



LARGE OVERHUNG LOAD CAPACITY
Large shafts, oversize bearings...rigid mountings with wide bearing spans to handle maximum loads.



PRECISION GEARING
Heat-treated alloy steel gearing, precision cut and shaved after heat treatment to eliminate distortion.

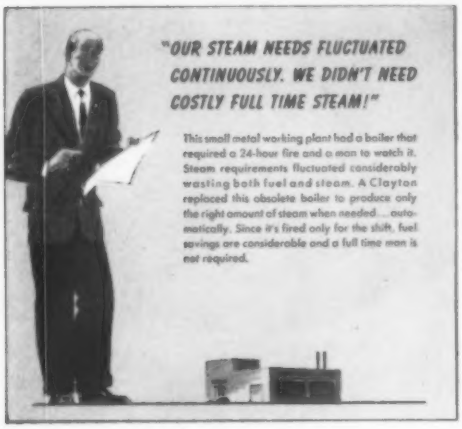


SEALED HOUSINGS
Splashproof, dustproof, oiltight. Dual closures and one-way vents keep oil in, dust and moisture out.

For more facts circle 609 on Reply Card

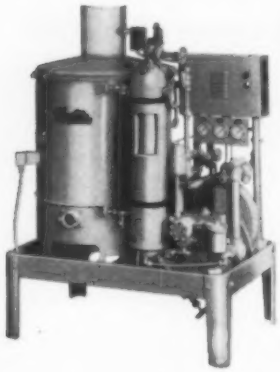
How a Clayton STEAM GENERATOR

"WE WERE FACED WITH AN OBSOLETE CENTRAL BOILER ROOM AND DETERIORATING TRANSMISSION LINES"
This well known chemical company had a sprawling plant with long transmission lines and condensation problems. Fluctuating steam needs throughout the plant made steam production a problem. The ordinary boiler had to be kept at full pressure all day ... fired all night. Seven Clayton Generators strategically located now provide just the right amount of steam—when and where needed. They are shut down at night. These seven Clayton generators installed cost less than the cost-of new transmission lines.


"OUR STEAM NEEDS FLUCTUATED CONTINUOUSLY. WE DIDN'T NEED COSTLY FULL TIME STEAM!"
This small metal working plant had a boiler that required a 24-hour fire and a man to watch it. Steam requirements fluctuated considerably wasting both fuel and steam. A Clayton replaced this obsolete boiler to produce only the right amount of steam when needed ... automatically. Since it's fired only for the shift, fuel savings are considerable and a full time man is not required.

SOLVED THREE *different* STEAM PROBLEMS!

These actual case histories represent only a few of the reasons why smart business men buy Clayton Steam Generators. Basically the story is more steam at less cost in only one fourth the space occupied by ordinary steam boilers. They cost less to install too ... no stacks to erect, no walls to knock out, lower rigging expense and lower hauling costs. The secret of Clayton's higher efficiency is *controlled circulation*—no space consuming straight tubes, but instead, a principle of using a coil without fired vessels ... easier to operate and maintain. From a cold start, Claytons produce steam in 3 minutes. Let a Clayton representative give you the complete facts.



"IT WAS HOPELESS! WE NEEDED MORE STEAM AND WE DIDN'T HAVE ROOM FOR IT!"
Here was a well known beverage syrup company located in "midtown" squeezed in between buildings on all sides. To meet its additional steam needs, it went in only one direction ... up! Since a Clayton produces the same amount of steam in only one fourth the space and weighs only a fraction as much as an ordinary boiler, it was relatively simple to put two Clayton steam generators on the roof! The installation was quick and inexpensive.

Clayton MANUFACTURING COMPANY

Sirs:
Please send us more information on Clayton Steam Generators.

Name _____
Company _____
Address _____
City _____ Zone ____ State _____
We use steam for _____

Send to: Clayton Manufacturing Company
401 N. Temple City Blvd.
El Monte, California

For more facts circle 610 on Reply Card

NEW PRODUCTS

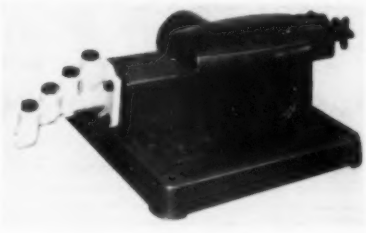
(Begins on page 148)

power application while eliminating much of the mechanism usually required to operate a fork lift truck; it requires no clutch assembly, transmission, drive line or differential, and eliminates manual shifting levers. Pedal movement is said to result in a smooth, rapid pick-up, with no jarring of loads, and "inching" is accomplished by this same pedal control. The new drive action is also reported to increase grade "pull" about 20 per cent with rated load. Company says the cost of Towmostatic Drive is surprisingly nominal. Towmotor Corp.

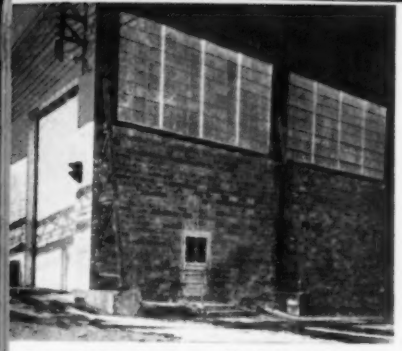
It's easy to obtain product data with the postage-free Reader Service Cards provided on pages 219-220. Use them for information on advertised products, too. Just circle the key number appearing at bottom of the ad.

57—FEEDER PUMPS feature design improvements

Controlled volume pumps in the new Milroyal line use a minimum of working parts and bearing surfaces to translate high speed rotary motion to low speed reciprocating motion. Totally enclosed, this speed reducer is an integral part of the pumps and runs in an oil bath. This combined Polar-Crank drive unit and speed reducer permits manual or automatic adjustment of capacity from 0 to 100 per cent. The capacity adjustment closely approximates a liner relationship and can be made while pump is running. It is noted that the plunger of the pump always returns to the same forward position on each stroke regardless of stroke length to assure maximum displacement efficiency. Initial units of the Milroyal line are offered with company's Step-Valve alloy steel liquid ends providing repeatable accuracies given as ±1 per cent. Using standard speed motors, several of these



For more facts circle 611 on Reply Card ⟶



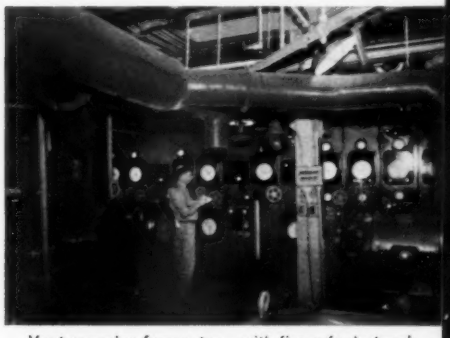
Stop window breakage with flat panes of shatterproof Hetron and fibrous glass. They come precut, install like ordinary glass.

Meet code requirements with a material that's recognized as safe in locations where fire might be a hazard.

Save time on installation with big Hetron-based panels that require no special framing or sash, go up fast because they're so light in weight.

Wash out glare and shadows with light-transmitting areas that relieve eyestrain and fatigue, make your plant more productive.

Remember, not all polyester panels are fire-retardant. Hetron-based panels carry U/L label or Factory Mutual seal of approval.



Vent corrosive fumes, too—with fire-safe ductwork of Hetron-and-glass that outlasts metal, requires little or no maintenance.

These daylighting panels *retard fire*

You can get safer plastic glazing now—with fire-retardant panels made of fibrous glass and Hetron® polyester.

These panels *won't support combustion*—can't contribute to spread of a blaze. They help you keep insurance rates low; meet stiffest code requirements.

At Factory Mutual Laboratories, commercial Hetron-based panels were ignited with a controlled gasoline-vapor fire in a 100-foot-long test building. Roof panels directly above the flames vented in four minutes. Temperatures dropped sharply. The test continued for half an hour—with virtually no further damage to the panels.

Hetron's flame resistance is chemically locked in—resulting in permanent safety. There is no loss of strength, because no additives are used.

These panels *resist corrosive fumes.* They're *shatterproof.* Rocks bounce off them. Blast shock, high winds, severe vibration have no effect on them.

You can get them now from leading fabricators. We make the Hetron resin that goes into them. When you buy, be sure to specify *Hetron-based panels*, or fire-retardant grade.

For a list of fabricators who can supply you, write us now.

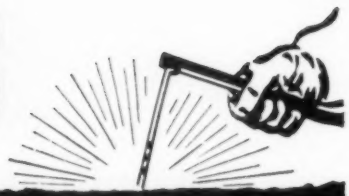
DUREZ® HOOKER CHEMICALS PLASTICS

PLASTICS DIVISION

HOOKER CHEMICAL CORPORATION

3911 Walck Road, North Tonawanda, N. Y.

Weldynamics



ARC WELDING AT WORK CUTTING COSTS

Weld questionable steels with . . .

JETWELD LH-70

- *Outstanding overhead and out-of-position operation*
- *High physical properties*
- *Fast, easy iron powder action*

Jetweld LH-70 operates overhead with the smooth, fast action—and has the high physical properties of a low hydrogen rod.

Produces crack-free welds on heavy plate with a minimum of stress relieving. Reduces the need for preheat on medium carbon steels—makes porosity free welds on sulphur bearing steel.

A.W.S. Classification E-6016.

Look for the three dots • • • symbol of Lincoln quality. Weldirectory of Lincoln mild steel electrodes Bulletin 7000.1 sent free on request.

The World's Largest Manufacturer of Arc Welding Equipment

© 1958 The Lincoln Electric Company

THE LINCOLN ELECTRIC COMPANY, DEPT. 4005, CLEVELAND 17, OHIO

For more facts circle 612 on Reply Card

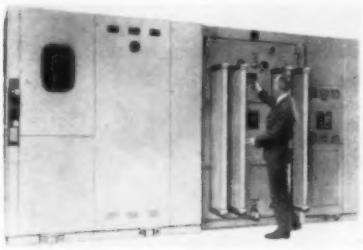
NEW PRODUCTS

(Begins on page 148)

controlled volume pumps can be coupled to a single motor; yet each pump will have its individual capacity adjustment. The pumps have maximum capacities to 29 gph and meter against pressures to 1900 psi. Milton Roy Co.

58—LOAD CENTERS for electrical distribution

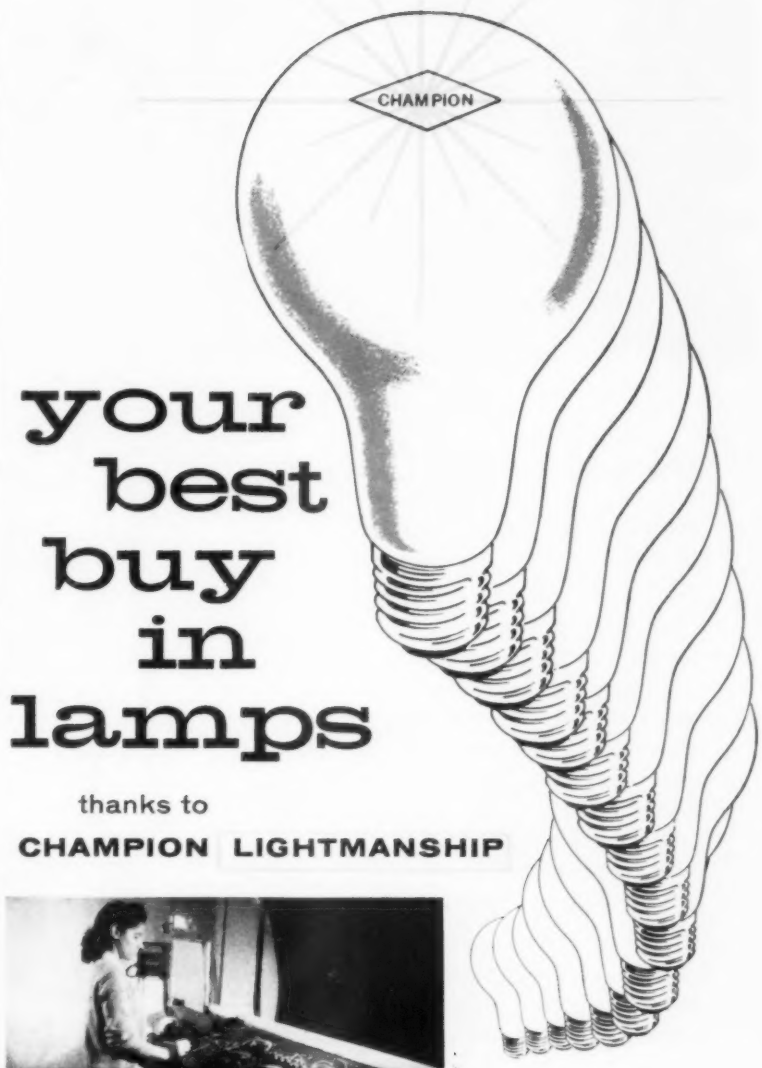
Nine new models of this company's packaged substations, called Tranfo Units, extend coverage of the line to more than 90 per cent of all industrial and commercial applications, it is announced. These are pre-engineered load centers for



stepping down primary voltages; they contain both the transformer and its primary protective and secondary distribution devices. Manufacturer points out that these packaged substations offer great savings over custom-designed systems because: no special engineering time is required, and installation time and expense are minimized. Sixteen basic types of Tranfo Units cover both indoor and outdoor applications. Units come in ratings from 45 to 3000 kva for stepping down primary voltages from 2.4 through 13.8 kv to 208/120 through 600 v. Four types of transformers are available: oil filled, askarel filled, and sealed or ventilated dry types. Transformer and Rectifier Div., I-T-E Circuit Breaker Co.

59—ANTI-SLIP PRODUCT absorbs, oil, grease, water

Soakup is reportedly able to absorb 425 per cent of its weight in oil alone. It can also dissolve residual oil films when water is added to it, manufacturer states. The material is described as an aluminum silica in calcined form, inert and sterile. It is capable of soaking up oil, water, grease or acids, instantly, and can be swept up immediately after applying, according to company, but if left on the floor it will not become



your best buy in lamps

thanks to
CHAMPION LIGHTMANSHIP

MILLIONS OF LAMPS A YEAR . . .
ONE PLANT standard of quality control

TEST . . . TEST . . . TEST . . . Continuous testing is one of the many ways Champion applies LIGHT-manship to make sure that every Champion Lamp is uniform in life and light output . . . that you don't have to worry about early burn-outs and early dim-outs when you use Champion lamps.

Send for the New MAINTENANCE MANUAL. 48 pages of practical suggestions for making the most of your lighting system.

CHAMPION LAMP WORKS
Lynn, Massachusetts
A division of Consolidated Electric Lamp Co.

CHAMPION Lamps
Incandescent Fluorescent
Your best buy in lamps

For more facts circle 613 on Reply Card

How to get more work out of steam vessels

Here's how to increase production from steam units like autoclaves, kettles, dryers, heaters, etc., by proper trap selection. Use an Anderson dual-orifice Heat-Kwik Trap. Heat-Kwik Traps will heat up a unit 2½ times faster than a conventional trap. Here's how: Most traps vent air and drain condensate through a single orifice. Heat-Kwiks, however, have two orifices. A conventional inverted bucket orifice drains condensate and a separate auxiliary bellows orifice handles air.

This double action results in faster purging of air from cold units, boosts production and slashes steam costs. Where fast heating up is required, always insist on Heat-Kwiks.

ANDERSON HEAT-KWIK STEAM TRAPS

THE V. D. ANDERSON COMPANY
division of International Basic Economy Corporation
1939 West 96th Street • Cleveland 2, Ohio

Please send information on how to get more heat from steam units with your Heat-Kwik Traps.

Name _____ *Title* _____
Company _____
Address _____
City _____ *Zone* ___ *State* _____

Heats Up Production Units 2½ Times Faster

For more facts circle 614 on Reply Card

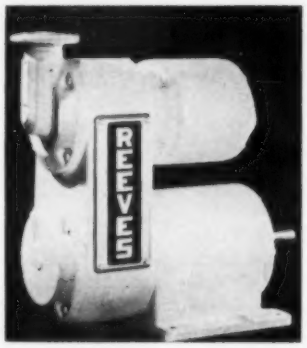
NEW PRODUCTS

(Begins on page 148)

soggy, heavy, or slippery. Due to its high-absorption factor, Soakup permits use of less material with faster action, it is pointed out. It weighs about 10 lb per cu ft, substantially less than many absorbents. Company says that Soakup is dustless, non-flammable and won't deteriorate in storage. The Bares Co.

60—V-S DRIVE has bright white enamel finish

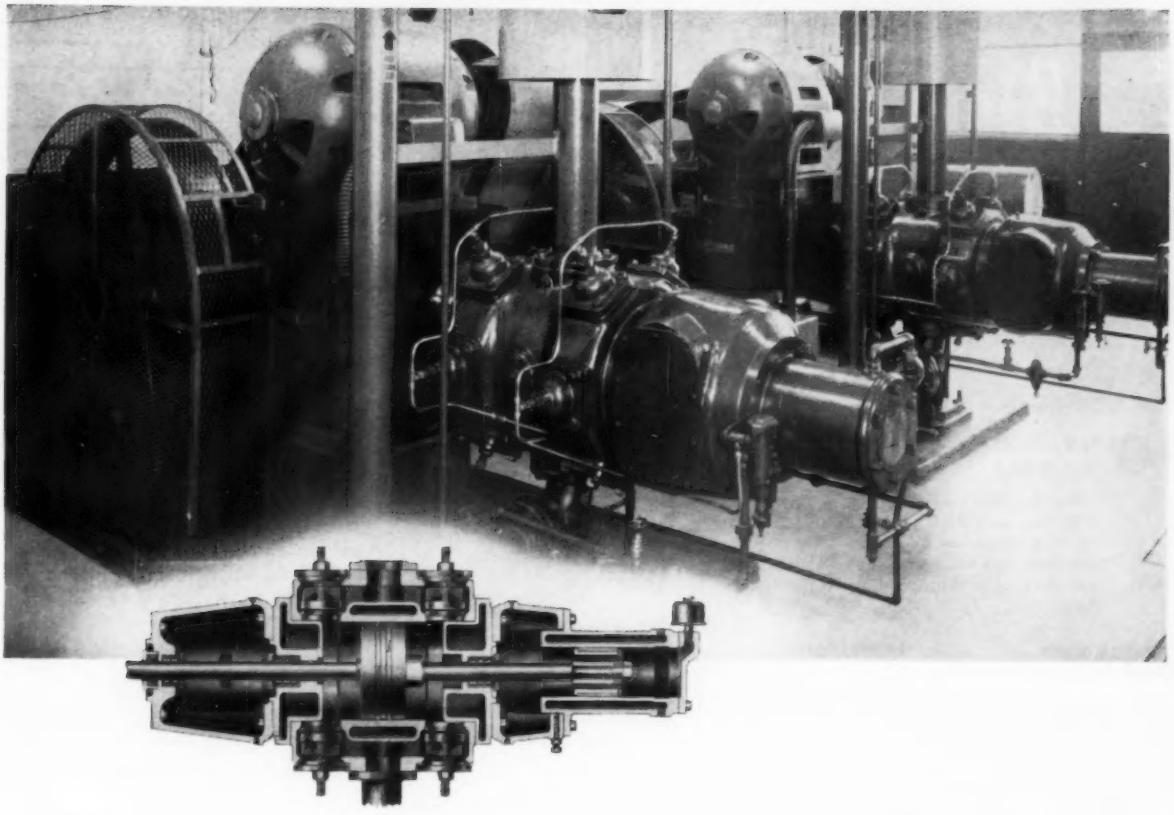
For food processing, pharmaceutical and other industries requiring extreme cleanliness, the sanitary type Motodrive is finished in high-gloss white enamel and available in sizes from ¼ through 10 hp. Depending on output speeds required, these



variable speed drive units are available with speed ranges up to 10-to-1 variation, with or without single, double or triple-reduction, built-in gear reducers. Interchangeable with company's recently redesigned 200, 300 and 400 Series Motodrive units, the sanitary model features sealed inspection plates, as well as a flat mounting pad to eliminate dirt under the drive unit. A built-in speed indicator is sealed against moisture and dirt, and seals are provided to keep dirt and moisture from collecting around the shaft or entering the drive housing through shaft openings. Reeves Pulley Co., Reliance Electric and Engineering Co.

61—INDUSTRIAL HOSE has wide range of application

Featuring flexibility and resistance to deterioration, this Neoprene industrial hose is extruded in continuous, seamless lengths, and has a spiral-ribbed construction which permits it to retain circular cross section even when subjected to sharp bends, it is stated. Hose can be crushed without damage, company



*with PENNSYLVANIA tailrod construction,

COMPRESSORS PROVIDE GUARANTEED OIL-FREE AIR

Protect your processing and instrumentation from the effects of oil or oily vapors in compressed air or gas with Pennsylvania Class 3-ATC tailrod compressors. These compressors are designed specifically for this service—not ordinary "oil-less" compressors adapted from conventional units.

Customers have found that the Pennsylvania 3-ATC provides long life and unsurpassed performance in installations where even the slightest amount of lubricant or oily vapor would interfere with delicate instruments, contaminate food and beverages or be incompatible with chemical processes. A typical user comment on tailrod compressors: "Machines have been in operation almost 19 years . . . we would consider maintenance to be entirely nominal."

Full details of the 3-ATC Compressor, which uses the Air Cushion Valve, noted for its simplicity of design and dependability in service, can be found in Bulletin 202. Write for your copy today.

***With PENNSYLVANIA tailrod construction** a full floating piston greatly prolongs the life of carbon piston rings and eliminates the danger of scoring cylinder walls. An extra long distance piece between cylinder and frame assures that no part of the piston rod which enters the lubricated frame will enter the cylinder stuffing box. Result: a compressor which will deliver air or gas guaranteed 100% free of oil or oily vapors due to lubricants.

PENNSYLVANIA PUMP AND COMPRESSOR CO.

Easton, Pa. • Earning customer confidence since 1920

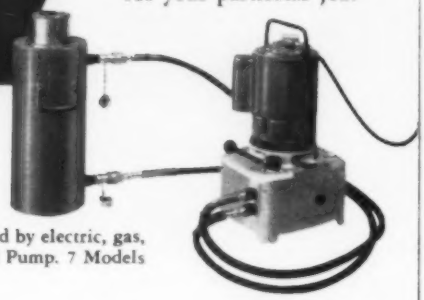
For more facts circle 615 on Reply Card

BIG 4

IN HYDRAULIC JACKS AND PULLERS BY SIMPLEX

...cut costs

Whether you push-pull-or-lift, SIMPLEX Hydraulic Equipment guarantees you satisfaction. The "BIG 4" described below are furnished in 28 models. You will find a SIMPLEX unit for your particular job.



1 "RE-MO-TROL" PULLERS

The "Re-Mo-Trol" Puller Unit is a powerful hydraulic Ram connected by high-pressure hose and remotely operated by electric, gas, air-powered or with hand-operated Pump. 7 Models have *"center-hole"*.

CAPACITY	APPLICATIONS	BENEFITS
10-100 tons 11 models	tensioning wire in pre-stressing concrete, pulling or pressing sleeves, gears, pinions, etc.	lift-pull-or-push in any direction easily & safely from a distance!

2 SIMPLEX "JENNY" CENTER-HOLE PULLERS

The "Jenny" is a rugged, *self-contained* unit for pulling or pushing the most difficult jobs with hydraulic power and efficiency.

CAPACITY	APPLICATIONS	BENEFITS
30-100 tons 6 models	mines, oil fields, shipyards, railroads, diesel, general maintenance, post tensioning concrete, etc.	push-pulls-lifts without torque through "center-hole".

3 ROL-TOE JACKS

CAPACITY	APPLICATIONS	BENEFITS
10, 25 and 50 ton 3 models	for toe lifting heavy machinery and equipment, also transformers.	lifts full capacity on cap or toe!

4 STANDARD HYDRAULIC JACKS

CAPACITY	APPLICATIONS	BENEFITS
3-100 tons 8 models	all general construction industrial maintenance problems.	smooth lift power, service-free operation!

500 lb. "Jack in a Box"

This 3" high Simplex Screw Jack will lift 500 pounds two inches. Has all operating and construction features of larger screw jacks. Also is ideal desk ornament, paper weight. 50c ea. Shipped prepaid cash or check.

MECHANICAL AND HYDRAULIC JACKS

SIMPLEX JACKS

TEMPLETON, KENLY & CO.

2561 Gardner Road • Broadview, Illinois

For more facts circle 616 on Reply Card

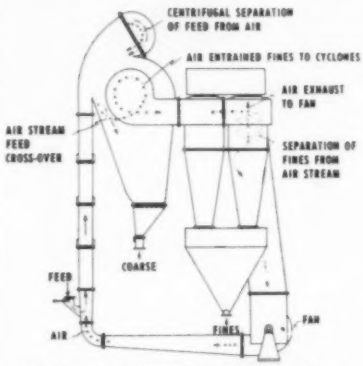
NEW PRODUCTS

(Begins on page 148)

says, and use of Neoprene elastomer gives it resistance to oxidation, ozone, oils, dilute acids, sunlight and heat aging, and abrasion. Typical applications include use as flexible duct for exhausting fumes, vapors, dust and mists, as flexible hose for low pressure conveying of powdered materials, and as flexible connections on machinery for handling air or gases. It is produced in diameters of 2, 2½ and 3 in., and in lengths up to 11 ft. Burton Mfg. Co.

62—CLASSIFIER separates dry fines from coarse matter

This Centrifugal Classifier System has no moving parts, utilizes but 0.04 to 0.5 hp per ton per hour, it is announced, and requires almost no maintenance. According to manufacturer, the classifier attains high



CENTRIFUGAL CLASSIFIER IN CLOSED CIRCUIT

operating efficiencies by utilizing a combination of aerodynamic forces in obtaining virtually complete separation of dry fines from larger material. For examples, the classifier is said to extract from most feed materials more than 98 per cent of the particles having diameters smaller than 325 mesh (44 micron) with no oversize material in the fines. The classifier is available in sizes to handle from 100 lb to 100 tons of feed material per hour and is recommended by manufacturer for classification applications in the 400-200 mesh range. Buell Engineering Co., Inc.

63—STAINLESS CONTAINERS have tip-proof feature

These stainless steel stacking containers include light-proof, drip-proof covers, shaped to hug the container and thus prevent tipping. The containers come in seven sizes from

Copon Arocoat—the Proven Epoxy-Coal Tar Coating

Unique formula cures quickly into a tough, tightly bonded, abrasion resistant shield against corrosive chemicals and fumes.

Copon Arocoat, the newest member of the Copon line of coatings specifically designed for corrosion control, is providing new answers for many of industry's toughest and most expensive corrosion problems.

Arocoat has been used profitably to cut traditional corrosion losses in paper mills . . . to add new life to condensate tanks and vessels, hopper cars, casing and conveyors . . . to provide internal or external protection for acid, alkali, sour crude and brine storage tanks . . . to reduce maintenance costs on cooling tower equipment.

Economically applied by spray or brush, it has also been used to provide superior protection for marine equipment and submerged, buried and exposed gas and petroleum transmission lines.

If you have a corrosion problem that seems to defy profitable solution, get complete information on Copon Arocoat. Write today to the Copon Associate located nearest to your city.

Copon.
FOR CORROSION CONTROL

Normal Copon — the versatile maintenance coating • **Activated Copon** — for greater chemical resistance • **Copon Mastic** — high build for critical areas • **Copon Met-L-Pon** — the metallic zinc coating • **Copon High Bake** — the ultimate in chemical-resistant coatings.

COPON ASSOCIATES

BENNETT'S
65 W. First South St., Salt Lake City, Utah
WALTER N. BOYSEN CO.
42nd and Linden Sts., Oakland 8, Calif.
2309 E. 15th St., Los Angeles, Calif.
BRITISH AMERICA PAINT CO., LTD.
P. O. Box 70, Victoria, B. C., Canada
BROOKLYN PAINT & VARNISH CO., INC.
50 Jay Street, Brooklyn 1, N. Y.
COAST PAINT & LACQUER CO.
P. O. Box 1113, Houston 1, Texas
OAST PAINT & LACQUER De MEXICO, S. A.
Apartado Postal No. 9637, Mexico, D. F.
ENTERPRISE PAINT MANUFACTURING CO.
2841 S. Ashland Ave., Chicago 8, Ill.
INDUSTRIAL PAINT MANUFACTURING CO.
P. O. Box 2371, Birmingham 1, Alabama
E & F KING AND COMPANY, INCORPORATED
640 Pleasant Street, Norwood, Mass.
KOHLER-McLISTER PAINT CO.
P. O. Box 546, Denver 1, Colo.
McDOUGALL-BUTLER CO., INC.
2929 Main St., Buffalo 14, New York
MULSYN PAINT & CHEMICALS
64-70 Hanover Street
Fitzroy, N. 6, Melbourne, Aust.
JAMES B. SIPE and COMPANY, INC.
P. O. Box 8010, Pittsburgh 16, Pa.
SOCIETE DES VERNIS PYROLAC
51, Rue De Lechat Creteil (Seine), France
WILBUR & WILLIAMS COMPANY
130 Lincoln Street, Boston 35, Mass.

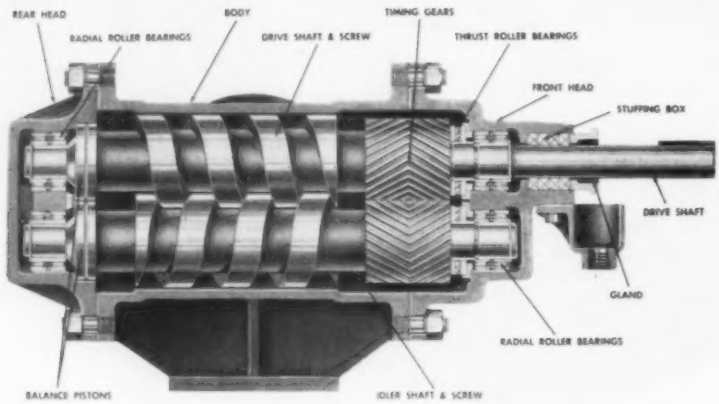
Mail to the Copon Associate located nearest your city.

_____Send complete information on Copon Arocoat.
_____I would like to discuss a corrosion problem with one of your technical representatives.

NAME_____
TITLE_____
FIRM_____
ADDRESS_____
CITY_____ STATE_____

For more facts circle 617 on Reply Card

SIMPLICITY lowers the cost of this WARREN TWIN SCREW PUMP

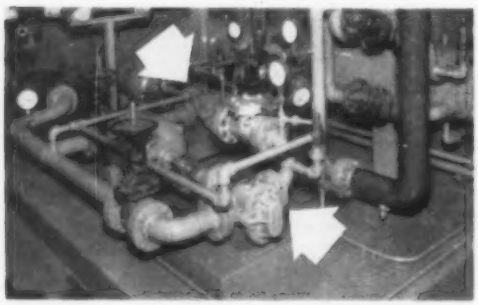


Here's an inside view of a high-speed screw pump that will do the work of other top quality rotary pumps costing twice as much!

Notice the simple construction of this Warren Twin Screw Pump, and the minimum number of parts. The compactness means low initial cost . . . and because no special foundation is needed, installation costs are minimized. No modification is required for vertical operation where floor space is extremely limited, or where the driver must be elevated to prevent flooding.

Maintenance of this efficient type TS pump is also economical. By removing the rear head only, rotating elements can be withdrawn *without disturbing the piping or motor,* and repair parts *that need no field machining* can be shipped immediately from stock.

Four sizes of type TS Screw Pumps are available for capacities to 550 GPM and discharge pressures to 350 PSI over a wide viscosity range. They are particularly suited for *fuel oil services* and other heavy duty oil services requiring a constant, pulseless flow. An ideal application is pictured below.



Two Warren Type 337TS Twin Screw Pumps on *fuel oil burner service* are shown in this installation at the Holyoke, Mass. Gas & Electric Department Plant.

WRITE FOR BULLETIN 255

for more detailed information about the TS Screw Pump that does the job for about one-half the cost.

WARREN

CENTRIFUGAL · SCREW · RECIPROCATING · ROTEX

WARREN PUMPS, INC.

WARREN, MASSACHUSETTS

P-37

For more facts circle 618 on Reply Card

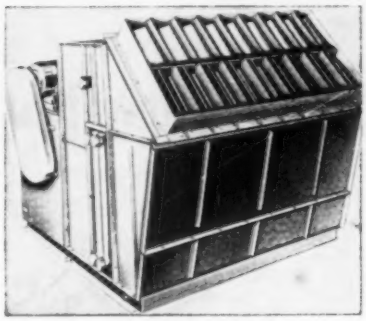
NEW PRODUCTS

(Begins on page 148)

a diameter of 4½ in. and a 5⅞ in. height to an 18-in. diam and a 13⅞-in. height. The two largest models have handles. For easy and complete cleaning and long life, containers are seamless. In addition, stainless steel construction makes items suited for operations where corrosion or contamination cannot be tolerated. S. Blickman, Inc.

64—AIR DISTRIBUTORS for multi-zone application

For air blending in multi-zone applications, Series 1600 Air Distributing Units include basic sizes for capacities of 4000 to 34,000 cfm, with units made to handle up to 16 separate zones. They are blow-through



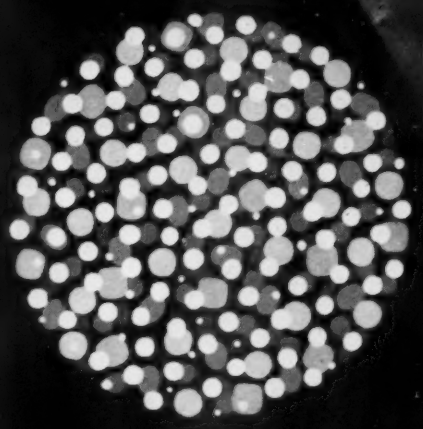
type with outlet divided to serve either cooled or heated air or controlled mixtures of the two to each zone. The number of zones which can be served by a single unit varies with the unit size. All sets of dampers are interconnected with a single, continuous external connecting rod which can be cut in the field to suit the required number of zones. Individual zone control is then obtained by the use of separate modulating damper motors. Sturtevant Div., Westinghouse Electric Corp.

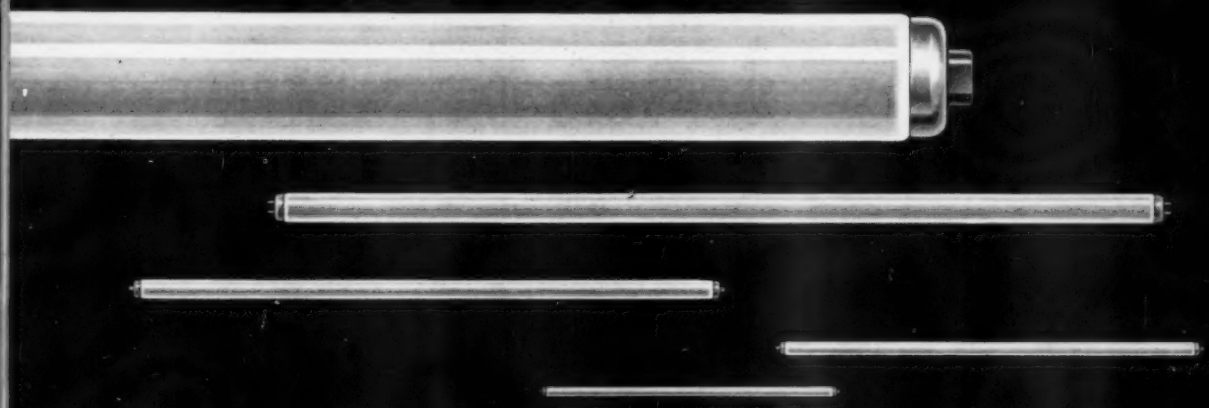
To receive product data circle item numbers on the handy Reader Service Cards provided on pages 219-220.

65—PIPE COUPLING of cement-impregnated fabric

For making permanent cement couplings on multiduct concrete, clay or tile pipes and conduit, Cement Bandage is a cotton fabric impregnated with a Portland cement composition and is available in a variety of widths, and lengths and several

Only Sylvania's exclusive coating process homogenizes phosphors for maximum brightness





An exclusive process homogenizes Sylvania's brighter phosphors—produces today's most uniform lamp coating for today's brightest lamps

Another reason why

Sylvania Fluorescents give you more light at lower cost than all other brands

Advanced engineering makes Sylvania fluorescent lamps superior in many ways—makes light a better tool of production to increase profits

The story of phosphors is the history of chemistry in lighting. And from the beginning Sylvania has pioneered today's brighter, longer lasting fluorescent phosphors.

Year after year, Sylvania lamps have delivered more light for a far longer time than ordinary fluorescents because of their superior phosphors. In fact, only now are some other brands being introduced with the phosphor quality which Sylvania has long since improved.

One of these improvements is an exclusive coating process which uniformly distributes the phosphors throughout the tube. This unsurpassed uniformity is made possible by homogenizing the phosphors—and contributes a minimum of 3% greater brightness over other processes now in use.

This is another example of how Sylvania builds extra value into fluorescent lamps to help cut your lighting and operating costs.

Let your local Sylvania Representative show you how Sylvania's superiority can save you time and money.

Call him today or write:

SYLVANIA LIGHTING PRODUCTS
Division of SYLVANIA ELECTRIC PRODUCTS INC.
60 Boston St., Dept. 8L-7011, Salem, Mass.

In Canada: Sylvania Electric (Canada) Ltd. P. O. Box 1190, Station "O", Montreal 9.

SYLVANIA Lighting Products

make light a better tool for profits

LIGHTING • TELEVISION • RADIO • ELECTRONICS • PHOTOGRAPHY • ATOMIC ENERGY • CHEMISTRY-METALLURGY

For more facts circle 619 on Reply Card

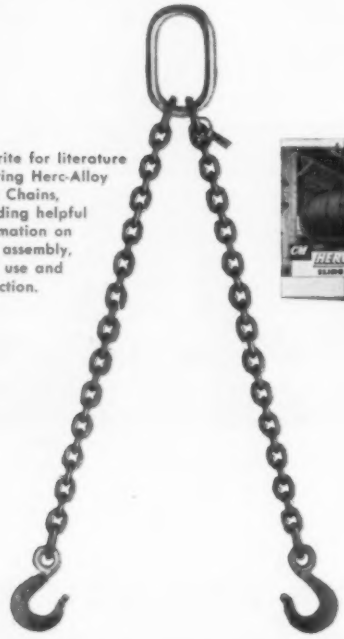
HERC-ALLOY

SLING CHAINS

● Herc-Alloy is the only exact-size alloy chain on the market. This uniformity gives you a lighter and easier-to-handle chain without any sacrifice in working load limit.

● Herc-Alloy, the original alloy steel chain, is available in running lengths as well as in all types and sizes of slings made to customer specifications.

● Write for literature covering Herc-Alloy Sling Chains, including helpful information on their assembly, care, use and inspection.



● CM also produces a complete line of chain attachments and welded chain of all types including stainless steel and bronze.

Hammerlok® COUPLING LINKS

● Assemble or rebuild your own Herc-Alloy sling chains with all components furnished by your local distributor. Hammerlok is simple, safe, reusable. New Herc-Alloy assemblies can now be ordered with welded or Hammerlok Coupling Links as desired.

CM HOISTS AND CHAIN

CALL YOUR CM CHAIN DISTRIBUTOR

COLUMBUS McKINNON

CHAIN CORPORATION

Tonawanda, New York

Regional Offices: NEW YORK • CHICAGO • CLEVELAND

In Canada: McKINNON COLUMBUS CHAIN LTD., ST. CATHARINES, ONT.

Herc-Alloy®

For more facts circle 620 on Reply Card

NEW PRODUCTS

(Begins on page 148)

layers of fabric. It is backed with a rubber impregnated waterproof paper and packaged in accordion folded units for easy handling. For application, cement bandage is soaked in water and drained, then unfolded and laid under the end of the duct. The next section of duct is laid down and the fabric is pulled over the top of the duct, smoothed in place and stapled—to complete the seal. According to company, use of Cement Bandage insures a permanent, fast connection in all soil conditions. Cement Bandage is easy to store and handle on the job, company says, and gives a uniform, positive seal to each coupling even when used on broken ends. Permacel.

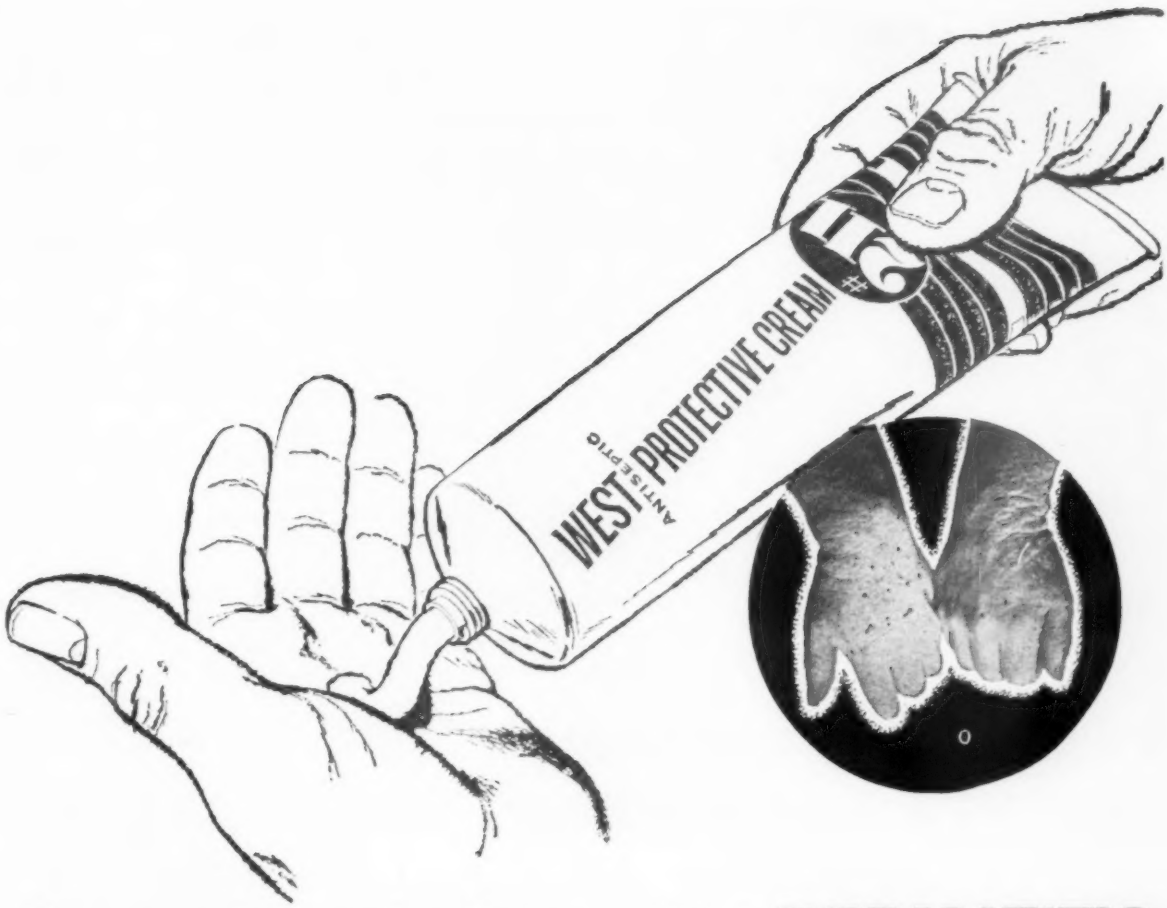
66—THERMOMETER has a 2-in., easy-reading dial

Providing mounting convenience without sacrificing visibility, this newest of American Bi-Metal Dial Thermometers has a 2-in. dial, white with large, black figures. Maxivision

dial construction is provided to eliminate parallax error. Graduations are set on a raised ring close to the cover glass at the same level as the pointer. The pointer literally "points out" graduations without confusing perspective effects, it is noted, and even from a distance the readings are sharp. The pointer is adjustable over the entire range for simple calibration. Standard ranges are –80/120 F to 200/1000 F and –50/50 C to 100/500 C. Accuracy is given as within 1 per cent of range. Manning, Maxwell & Moore, Inc.

67—TIME SWITCH carries its own reserve power

Tork's Reserve requires no winding, maintains "on time" operation during even prolonged "outage" periods, it is announced, and, in the event of a series of outages in a short span of time will always be "on duty." The device offers safety benefits and savings in time, money and manpower. Reserve action of the control



Ten weeks protection against **DERMATITIS**

The above 10 oz. tube contains enough cream to protect the hands of a valued employee for ten weeks. West Antiseptic Protective Creams are formulated in accordance with the accepted recommendations of leading authorities in the field of Industrial Dermatitis. They are used as easily as ordinary hand creams. The result: comfortable, invisible protection that keeps industrial irritants from prolonged contact with the skin.

West Antiseptic Protective Creams are normally used four times a shift. They are part of a program that overlooks no contributing source of dermatitis — the highly successful West Program of Dermatitis Prevention and Control.

How does it work?

Lanokleen, antiseptic soaps and other specially formulated hand cleaners insure safe, effective cleansing. Germicidal specialties protect against bacterial infections. "Vinylite" aprons and armguards prevent clothing contamination. And, of course, Antiseptic Protective Creams help protect exposed skin areas.

The West Program of Dermatitis Prevention and Control is an inexpensive way to protect workers and management against the needless penalties of dermatitis. Interested? Just send the coupon. Or call your local West office.

Programs and Specialties for
Preventive Maintenance and Protective Sanitation

WEST CHEMICAL PRODUCTS INC.

WEST DISINFECTING DIVISION

WEST CHEMICAL PRODUCTS INC., 42-16 West Street, Long Island City 1, N. Y.
Branches in principal cities • In Canada: 5621-23 Casgrain Ave., Montreal

☐ Please send me your 24 page booklet, "The Control of Dermatitis in Industry."
☐ Please have a West Representative telephone for an appointment.

Name .....

Position ..... Dept. 13

For more facts circle 621 on Reply Card

the 14th INTERNATIONAL HEATING & AIR-CONDITIONING EXPOSITION

Under Auspices ASHAE

Convention Hall Philadelphia
January 26-29, 1959

Here under one roof you will have the opportunity to see the newest equipment and techniques developed in the past two years for the better control and improvement of indoor climate.

Some 450 fact-filled displays will show you the way to provide year-round comfort—in the plant—in the office—in the home—or in the restaurant, hotel, hospital and any other four-walled enclosure.

This year-round indoor comfort will pay untold dividends—in higher productivity, lower absenteeism, and increased employee morale—creating space that will be in greater demand, used to better advantage.

See and discuss with representatives of the leading manufacturers just how the latest developments can be put to work for you—On A Profitable Basis.

Make your plans to attend, now. Write the Exposition today for advance registration and hotel information.

14th INTERNATIONAL HEATING & AIR-CONDITIONING EXPOSITION

480 Lexington Avenue, New York 17, N. Y.

Management: International Exposition Company

1260

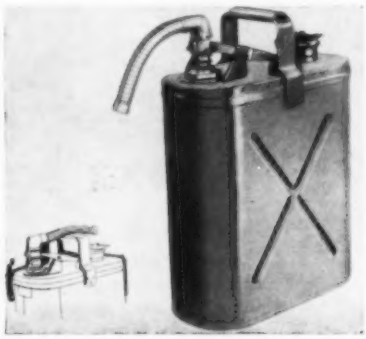
NEW PRODUCTS

(Begins on page 148)

is provided by a powerful spring, electrically wound by the time switch. A release mechanically exercises the spring daily, it is explained, and this regular exercising serves to keep the unit in condition. When power fails, the reserve power takes over and keeps the time switch in operation for up to 17 hr. With power restored, normal a-c operation of the time control is resumed, and at the same time the reserve spring is rewound. Manual rewinding isn't necessary. If the reserve power is used for the full 17-hr period, it is still rewound in 2 hr, company states, and shorter outages require less time. Tork Time Controls, Inc.

68—SAFETY CAN handles and stores easily

The oval shape of this 5-gal capacity can is claimed to make a more compact container requiring less storage space and easier to handle and use. Five oval cans are stored in the same



area required for three of the customary round safety cans, it is pointed out. They have a metal pouring spout which swivels to a "tuck-away" position over the can body when not in use. The fill opening cap opens 80 deg for quick filling, and both fill opening and dispensing opening have perforated metal fire baffles. The self-closing cap over the fill opening also serves to supply automatic vapor pressure relief. Protectoseal Co.

69—SILICON RECTIFIER for processing lines

Designed to provide regulated or unregulated d-c power for steel, electrochemical, plating and other continuous processing lines, this water-cooled silicon rectifier uses saturable reactor-amplistat control to maintain current level within ± 1

ON RAIL . . . ON RUBBER AMERICAN YARD CRANES HANDLE STOCK—FAST!

A distributor of heavy construction materials, rail and track equipment, L. B. Foster Co., Atlanta, requires dependable yard handling equipment for fast stockpiling . . . fast loading. In their big six-acre yard, an American DiesELectric* Locomotive Crane and an American 300 Series Self Propelled Crane team up to provide powerful, maneuverable materials handling service on rail and rubber.

Speed is essential for Foster's prompt customer service . . . their Americans meet this demand—move heavy loads fast, spot them accurately!

American DiesELectric Locomotive Cranes handle yard switching jobs with speed—even move loaded cars over grades and curves. They feature *smooth electric power* for travel . . . *efficient diesel power* for lifting.

In large yards . . . like Foster's . . . American Self Propelled Cranes meet the demand for mobility and speed. They maneuver easily in tight spots, roll smoothly down aisles . . . pay off in increased materials handling volume.

"*Fast, efficient, dependable* on every yard job" sums up industry's report on American Cranes in action! Low operating costs—minimum nonproductive downtime result from American's job tested design and precise manufacture.

Ask us to show you Americans *on the job.* You'll find their performance in every application outstanding. Capacities of American Crawler and Truck Cranes range from 12½ to 50 tons . . . Locomotive Cranes to 130 tons!

*Trademark

PROMPT DELIVERY of heavy construction materials requires fast, dependable yard cranes. Foster uses an American 300 Series Self Propelled Crane (above) for truck loading—an American DiesELectric Locomotive Crane (below) for switching, moving cars and handling heavy shipments.

AMERICAN HOIST
and Derrick Company
St. Paul 7, Minnesota

EXCAVATORS-CRANES to 2 yds.-50 tons
DERRICKS-HOISTS to 800 tons
LOCOMOTIVE CRANES to 130 tons
REVOLVER-CRANES to 400 tons
AMERICAN HOIST PACIFIC COMPANY — Special materials handling equipment
CROSBY-LAUGHLIN DIVISION — Drop forged fittings for wire rope-chain

For more facts circle 623 on Reply Card

"WE REDUCED INSTALLATION TIME 25%

with PITTSBURGH FIBER GLASS PIPE INSULATION"

says Mr. Charles W. Smith, President
Standard Insulation Products, Inc.
Baltimore, Maryland

Pittsburgh Fiber Glass Pipe Insulation is easily slipped on the pipe. Insulation will be hand-stapled in place, eliminating metal strap fasteners.

"We installed 4,800 ft. of Pittsburgh Fiber Glass Pipe Insulation at Our Lady of Fatima School in Baltimore on water, steam and dual-temperature pipes. The handling ease and application speed of this product, compared with the insulation material previously used, saved us 25% in installation time costs.

"The three-foot lengths are easily spread by hand at the seam and are slipped quickly and snugly over the pipe. Hand stapling eliminated the need for metal strap fasteners. For special lengths, the insulation was easily cut with a knife. Wastage was negligible. Cut ends retained their shape with no fluffing. Short left-over pieces were used on fittings.

"The factory-applied vapor barrier eliminates condensation, which reduces future maintenance costs. Outside jackets present a good appearance and can be painted to match room decorations."

SAVE TIME WITH PITTSBURGH PIPE INSULATION

You can order Pittsburgh Fiber Glass Pipe Insulation in a variety of thicknesses and jackets to your own specifications. For complete information, call your nearest PPG Sales Office, or write to *Pittsburgh Plate Glass Company, Fiber Glass Division, One Gateway Center, Pittsburgh 22, Penna.*

PITTSBURGH PIPE INSULATION IS A PRODUCT OF THE FIBER GLASS DIVISION OF PITTSBURGH PLATE GLASS COMPANY

Sales Offices are located in the following cities: Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, Minneapolis, New York Philadelphia, Pittsburgh and St. Louis

75th ANNIVERSARY 1883—1958 PPG

SYMBOL OF SERVICE FOR SEVENTY-FIVE YEARS

PITTSBURGH PLATE GLASS COMPANY

For more facts circle 624 on Reply Card

NEW PRODUCTS

(Begins on page 148)

per cent, with unit efficiencies of 90 to 95 per cent, depending on voltage rating of equipment. Available in ratings of 1000 to 10,000 amp at voltages to 300 v, the rectifier may be manually or automatically controlled by means of the saturable reactor which serves to provide stepless control 10 to 125 per cent current output. A feature of the rectifier is the short circuit limiting capabilities of the saturable reactor which restricts short circuit current to about 20 per cent greater than the current prior to the short circuit. Two fans are used to compensate for heat losses occurring in the transformer and saturable reactor. Filters may be installed. General Electric Co.

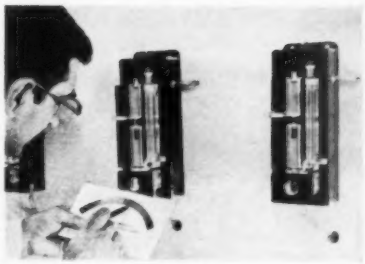
70—GLOBE VALVE for general purpose use

This round bolted bonnet, bolted gland globe valve is for 150 to 180 lb service and is available with screw ends or socket weld ends in ¼- through 2-in. sizes. These valves have forged steel bodies with integral seats hard faced with Stellite or equal. Disks are 13 per cent chrome stainless steel. Other trims available. Henry Vogt Machine Co.

71—INSTRUMENT for low cost colorimetric anaylsis

Announced as making colorimetric analysis simple and inexpensive, the Chemalyzer has no moving parts and needs no electric or pneumatic power for operation. It is powered by the gravity head of the entering sample and operation is continuous and automatic. It is stated that with it, untrained persons can make fast, accurate tests formerly requiring the work of skilled technicians. According to the manufacturer, the Chemalyzer costs only a third as much as conventional analyzers and enables tests to be made in a fraction of the time. In addition to monitoring chemical properties such as pH, residual chlorine, water hardness, phosphate and hydrazine or iron content in water solutions, this instrument can be used for titration control around a fixed end point.

The Chemalyzer mixes precise volumes of sample liquid and reagent to reveal sample properties colorimetrically. In operation, the sample is maintained at a fixed head in the sample reservoir and flows from there to the measuring chamber. Simultaneously, reagent is admitted



to reaction chamber at a level of 3 cc. Entire contents of sample measuring chamber are then discharged into the reaction chamber to mix with reagent. Mixture is then siphoned into the optical cell. To take a reading, you compare graduations on a standard color chart with the sample in the cell. Florida Instrument Co., Div., Milton Roy Co.

72—DUST FILTERS with strong, three-section bags

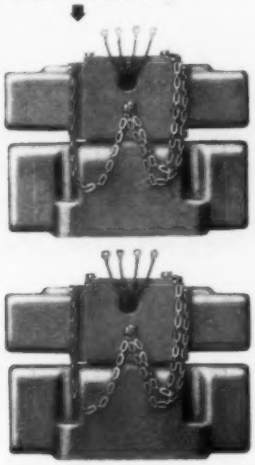
Bags that give up to three times longer life are now announced as standard equipment in this manufacturer's Dynaclone Dust Filters. Their simplified design is also claimed to reduce filter erection time and afford easier inspection. The new Resist-O-Wear Bag has two lengthwise

do they LOOK ALIKE? ...sure they do on the surface...

...BUT LOOK AT Logan's BIG EXTRA PLUS VALUES

◀ A LOGAN HYDRAULIC CONTROL VALVE

2 competitors' control valves



Logan Hydraulic Control Valves

are made to interchange with other leading manufacturers' control valves . . .

1 Logan designs assure the service required for those extra-rugged applications.

2 Over FORTY YEARS of fluid power components manufacturing know-how.

3 Built by CRAFTSMEN whose average service record with LOGAN is more than 20 years.

4 Manufactured in a plant which applies the most modern production methods.

FREE

SEND FOR THE "LOGAN CALCULATOR"

MEMBER: Natl. Mach. Tool Builders' Assn., Natl. Fluid Power Assn.

LOGANSPORT MACHINE CO., INC.
830 CENTER AVENUE, LOGANSPORT, INDIANA

PLEASE SEND COPY OF CATALOG:

☐ 100-1 AIR CYLINDERS
☐ 100-2 MILL-TYPE AIR CYLS.
☐ 100-3 AIR-DRAULIC CYLS.
☐ 100-4 AIR VALVES
☐ 100-5 LOGANSQUARE CYLINDERS
☐ 100-6 ULTRAMATION CYLINDERS
☐ 300-2 PRESSES
☐ FACTS OF LIFE
☐ 200-1 HYD. POWER UNITS
☐ 200-2 ROTOCAST HYD. CYLINDERS
☐ 200-3 750 SERIES HYD. CYLINDERS
☐ 200-4 AND 200-7 HYD VALVES
☐ 200-6 SUPER-MATIC CYLS.
☐ 300-1 CHUCKS
☐ ABC BOOKLET
☐ CIRCUIT RIDER

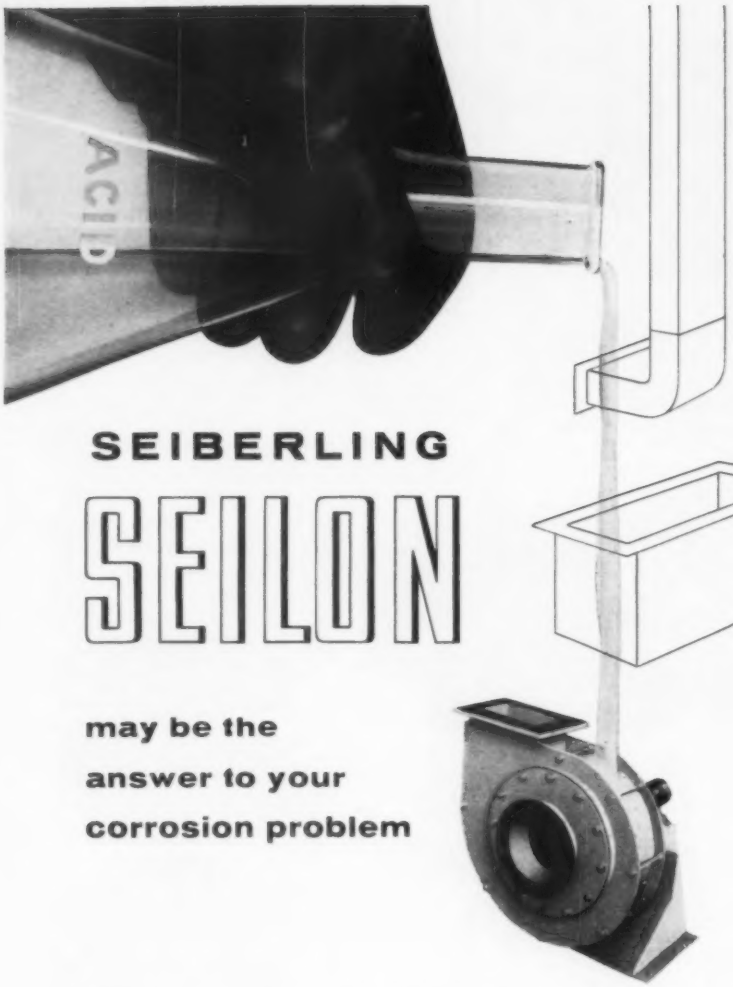
TO:

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

For more facts circle 625 on Reply Card



SEIBERLING

SEILON

may be the answer to your corrosion problem

SEILON, an unplasticized polyvinyl chloride, is chemically resistant to most acids, salts, alkalies, and oils. It has high molecular weight, excellent chemical, electrical and thermal properties. Seilon is available in Type I (normal impact) and Type II (high impact) grades.

Fabricators working with Seiberling Seilon have solved complex corrosion problems in many industries as Seilon is easily fabricated. It is produced in industrial grey sheets and plates which can be sawed, machined, hot formed, hot gas welded, or solvent bonded.

SEILON could be the answer to your corrosion problem. Why not write or phone us and let us advise you?

Plastics Division

SEIBERLING RUBBER COMPANY

NEWCOMERSTOWN, OHIO Phone 8-8304

For more facts circle 626 on Reply Card

NEW PRODUCTS

(Begins on page 148)

seams dividing it into three equal-size pockets. Two rubber-coated inner spacers are inserted in each section to make a total of six per bag. Spacer weight is, therefore, distributed on three seams, minimizing strain. Due to their smaller and stronger construction, the inner spacers are said to last indefinitely. The bags are made of a cotton sateen cloth woven to permit free passage of air while retaining finest dust particles. Each bag has a net effective cloth area of 22 sq ft. The W. W. Sly Mfg. Co.

73—LITTLE WRENCHES with 15-, 75-deg openings

These two 15- and 75-deg angle opening miniature wrenches are of drop forged alloy steel, heat treated

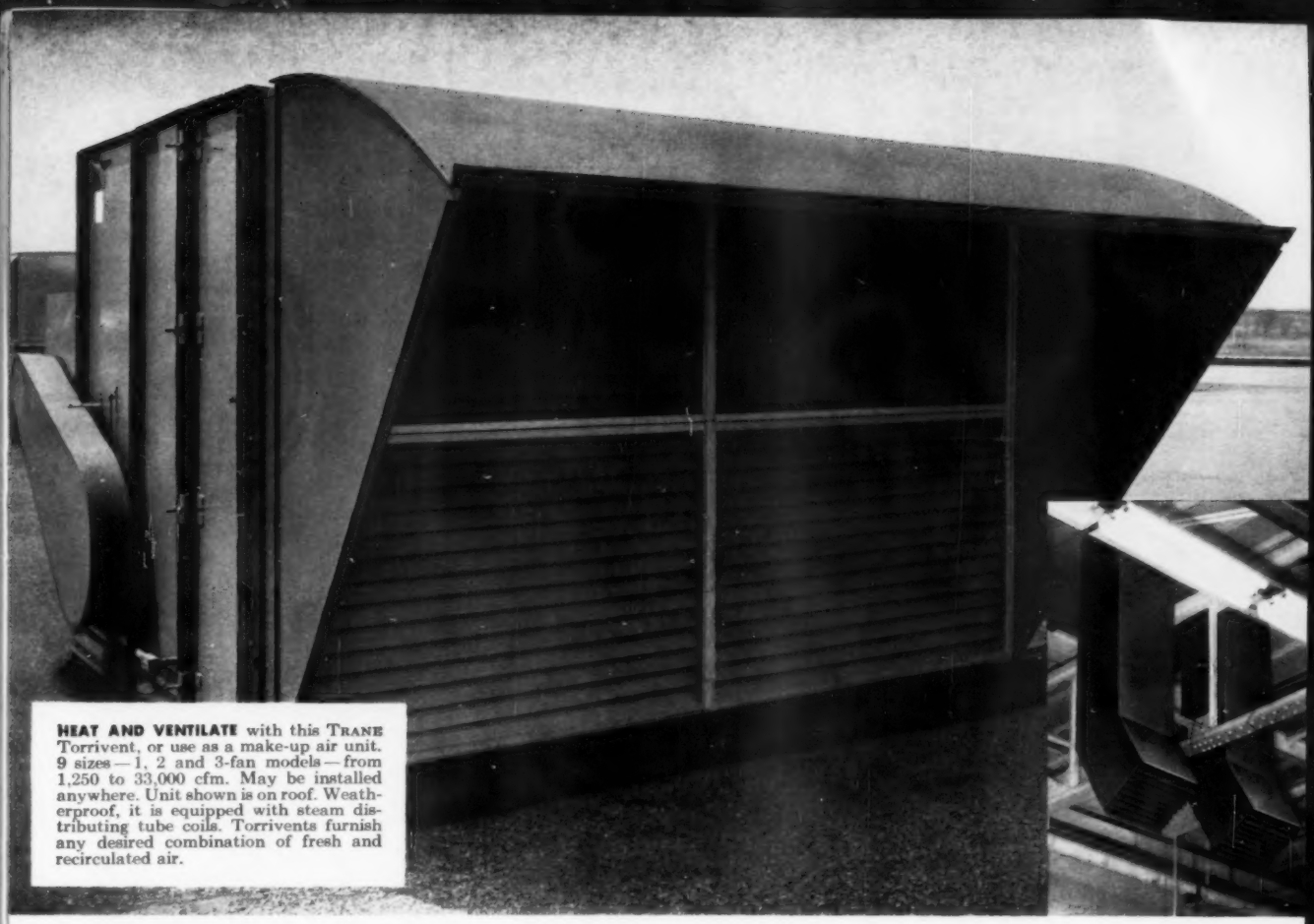
and chrome plated. The No. 1136 has 9/16-in. openings, the No. 1140, 5/8-in. openings. Both are 5½ in. long, overall, and have heads 3/16 in. thick. Armstrong Bros. Tool Co.

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 219-220.

74—ELECTRONIC CONTROLS offer several advantages

Electronic Consotrol Instrumentation, a series of solid state electronic control instruments, consists of transmitters, recorders, controllers, and valve operators, covering every function in the process control loop. Typical process measurements—pressure, flow and level—are converted at the transmitters to proportional current signals transmitted over unshielded lines to a control center. Converters for EMF and resistance measurements also feed signals to the small case, panel-mounted receivers. In the same electrical range are the controllers and final operators.

Outstanding features of the instrumentation, in addition to use of magnetic amplifiers and transistors, are: choice of motion balance or



HEAT AND VENTILATE with this TRANE Torrivent, or use as a make-up air unit. 9 sizes—1, 2 and 3-fan models—from 1,250 to 33,000 cfm. May be installed anywhere. Unit shown is on roof. Weatherproof, it is equipped with steam distributing tube coils. Torrivents furnish any desired combination of fresh and recirculated air.

Stop cold air infiltration in plants quickly, simply with a Trane Torrivent!

Rugged, big-volume heating-ventilating units supply make-up air to equalize exhaust-system loss

Here's how to solve the problem of discomfort conditions caused by adding exhaust equipment to plant heating-ventilating systems. When drafts, uneven heating result from cold air infiltrating around doors and windows, use rugged, high-volume TRANE Torrivent units to supply make-up air, create a positive instead of a negative pressure within the building.

The TRANE Torrivent both heats *and* ventilates. It delivers a large volume of air—fresh or recirculated—heated to uniform temperatures and delivered at uniform velocities. The Torrivent is widely used for curing and drying processes, too. And its exceptionally quiet operation makes it especially suitable for schools, institutions and auditoriums where a high noise level would be objectionable.

Guard against cold air infiltration the next time you plan a job—or correct this condition when it occurs—by incorporating a TRANE Torrivent into the heating-ventilating system. The Torrivent will offset exhaust-system heat loss, provide uniform comfort with lower fuel costs.

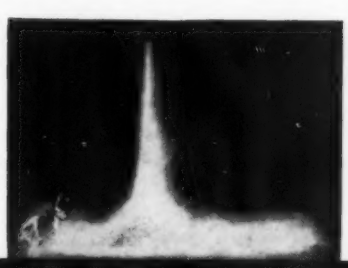
WANT MORE FACTS? For complete information on the Torrivent and other heating-ventilating equipment, call your nearby TRANE Sales Office. Or write TRANE, La Crosse, Wisconsin.

For any air condition, turn to

TRANE

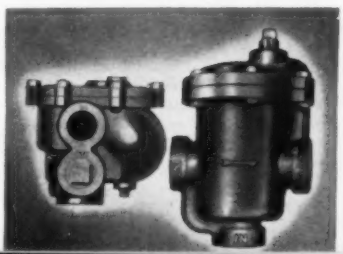
MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING, VENTILATING AND HEAT TRANSFER EQUIPMENT

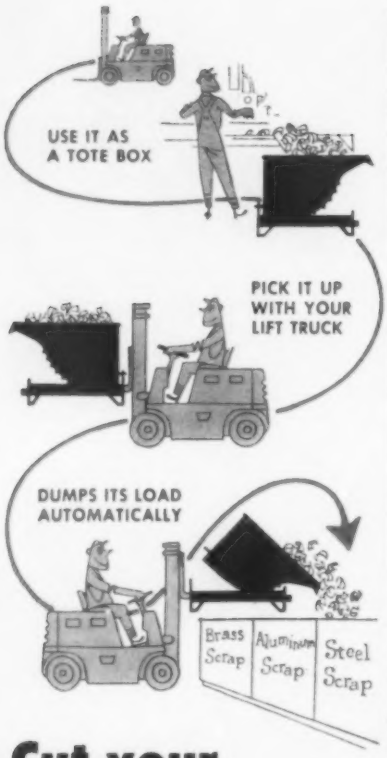
THE TRANE COMPANY, LA CROSSE, WIS. • SCRANTON MFG. DIV., SCRANTON, PA.
CLARKSVILLE MFG. DIV., CLARKSVILLE, TENN. • TRANE COMPANY OF CANADA, LIMITED
TORONTO • 97 U.S. AND 19 CANADIAN OFFICES



Any Heating Pattern is possible with this TRANE Projection Unit Heater! Exclusive diffusion features provide an almost unlimited number of heating patterns. Projection and Horizontal types available for any application.

Matched Equipment for *all* heating, ventilating equipment! The new, redesigned line of TRANE Steam Specialties saves fuel, gives you *matched* equipment for every job. Traps, strainers, valves, vents for any type of system.





Cut your scrap-handling costs 50%

Handling scrap metal is a simple, one-man operation when you use Roura Self-Dumping Hoppers. Place them in strategic spots for scrap collection. One man with a lift truck carries them to scrap bins or freight car . . . flips the latch and the hopper automatically dumps its load, rights itself, locks itself, and it is ready for another load. Hoppers may be labelled for different kinds of scrap for easy, profitable scrap segregation. No wonder they're cutting costs in hundreds of plants.

Forks or platform of any standard lift truck slip easily into under-frame of a Roura Hopper. Pick-up is swift and simple. Hoppers are made in five sizes, ½ to 2 yard capacity, and mounted on live or semi-live skids with choice of wheels.

They're made of 3/16" steel plate with continuous arc-welded seams. Good for years of toughest service. Standard models shipped from stock immediately. Also available in stainless steel and galvanized. Start now cutting costs with Roura.

ROURA
Self-Dumping
HOPPER

WANT DETAILS?

Clip this coupon . . . attach it to your letterhead . . . sign your name . . . and mail to . . .

ROURA IRON WORKS, INC.
1413 Woodland Ave., Detroit 11, Michigan

For more facts circle 628 on Reply Card

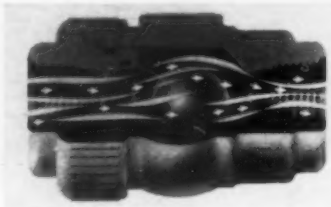
NEW PRODUCTS

(Begins on page 148)

force balance transmitters; electrical measurement converters, tubeless and mounted for front-of-panel accessibility; diversified installation arrangements using standard system components. Another advantage stressed is d-c transmission so that unshielded leads can be used with no effect from a-c pickup, and current system unaffected by changes in line or load resistance due to ambient temperature. The Foxboro Co.

75—CHECK VALVE is low-cost, plastic unit

The Chem-Check, a low-cost all plastic check valve, is available in PVC Types I and II, Kralastic, Penton and Profax. Mechanical features announced include: full-flow — low pressure drop; built-in vibration damper; standard connectors—



thread, socket, flanged; replaceable "seat seal." The valve comes in pipe sizes from ½ to 2 in., is reported easy to install and service, and may be operated in any position. The principle of the "seat seals" for high and low pressure consists of two separate seats. The first is a low pressure seal which is established on less than 1 oz of pressure differential and which unseats at the same pressure level. The high pressure "seat seal" is established as pressures increase and finally creates a solid seat to seal against flow and pressure to the ultimate strength of the valve itself. At the same time, this high pressure seal will unseat at low pressure differentials, company states. Chemtrol Co.

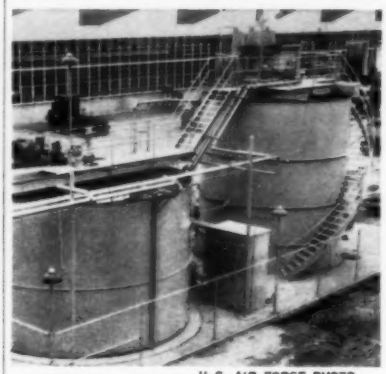
76—CONVERSION KIT for high voltage air switches

This kit is introduced for converting ampere ratings of all of manufacturer's voltage tilting insulator switches—making it unnecessary to replace entire switches when increasing line current. Switch conversion is claimed both easy and inexpensive because it can be made without removing switch from its

ILLCO-WAY ionXchange

soften
de-alkalize
clarify
WATER

REMOVE
organic matter
turbidity
color
iron



U. S. AIR FORCE PHOTO

HIGH-FLOW, UP-FLOW

CLARIFIER

The Clarifier shown above is part of an ILLCO-WAY ionXchange installation, at a metal-finishing plant, which is used for waste disposal and water recovery. Similar Clarifiers are widely employed to clear up surface waters used by various industries — removing organic matter, hardness, alkalinity, turbidity, color, and iron, as required by specific conditions.

USED AS PRE-TREATMENT

In many instances it is more economical to use a Clarifier in the initial part of a system. Certain water supplies contain organic matter or turbidity which can be removed most efficiently by flocculation, or contain carbonate hardness or alkalinity which can be largely reduced by precipitation — in which situations, a Clarifier is indicated as best. *Let us analyze the water you propose to use, and advise you.*

ILLCO-WAY

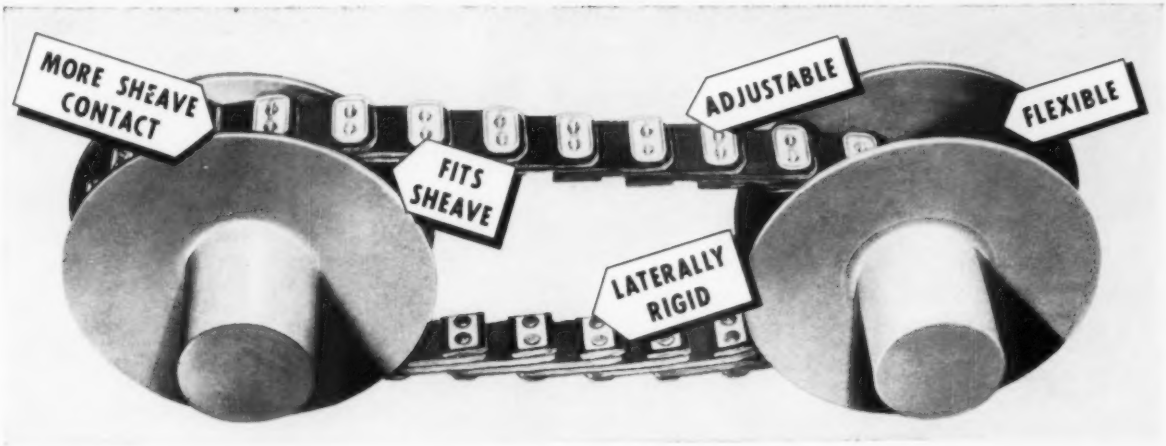
ILLINOIS WATER TREATMENT CO.
840 Cedar St.
Rockford, Ill.

NEW YORK OFFICE: 141 E. 44th St., New York 17, N.Y.
CANADIAN DIST.: Pumps & Softeners, Ltd., London, Can.

For more facts circle 629 on Reply Card

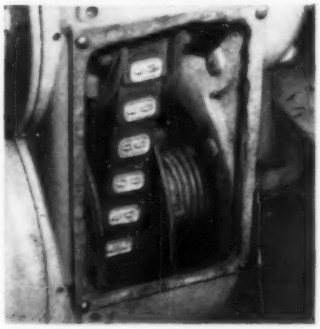
NEW! MANHEIM VARIABLE SPEED BELT

Replaces Enclosed Drive Belts Without Disassembly!



MVS Belt on a rotary annealing furnace drive gives dependable service even under extreme oil, dust and 200° F. operating conditions.

INSTALLS IN MINUTES INSTEAD OF HOURS— NO MACHINE DISASSEMBLY



A typical installation of a 2" MVS Belt operating an industrial production machine.

MVS BELT makes wood block and variable speed v-belts completely out-of-date

MVS Belt sets a new standard in V-to-V drives because it is adjustable to any length and is installed in minutes instead of hours.

Its patented design eliminates drive disassembly. MVS Belt is placed around the sheaves and coupled with T-screws and cup-washers, reducing down-time to a matter of minutes. Inventory costs are cut by eliminating the need to stock standard lengths. You can make as many as 25 sizes of variable speed belt from a single package of MVS Belt in a given top width. Each package contains 100 links, approximately 13 ft. Available in 26 widths from 1½" thru 5".

FREE LITERATURE SHOWS HOW MVS BELT DOES A BETTER JOB

Uniform thickness and width guarantee constant power delivery at all speeds with no cross-sectional distortion. MVS uniform links assure a perfectly balanced drive that reduces vibration and improves production quality. Priced to offer you big savings. *Write today for complete details on the new MVS Belt.*

★ ADJUSTABLE TO ANY LENGTH
★ GUARANTEES CONSTANT POWER DELIVERY
★ REDUCES VIBRATION UP TO 90%

MVS

MANHEIM
MANUFACTURING & BELTING CO.
Manheim 4, Pennsylvania

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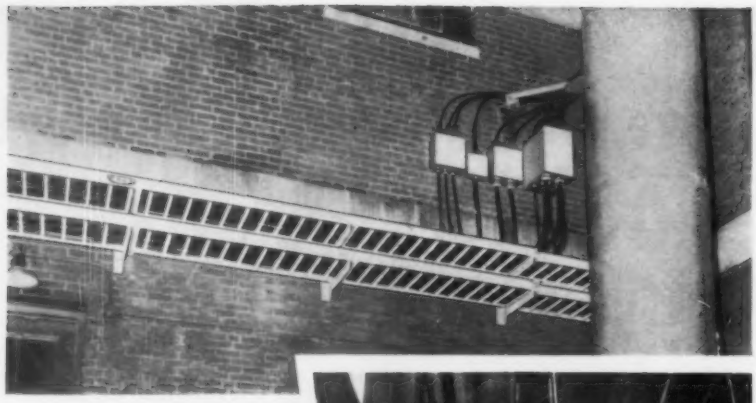
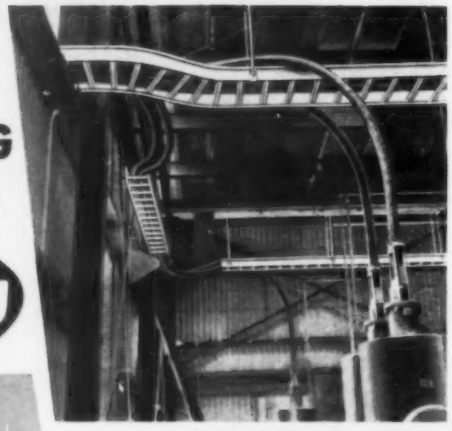
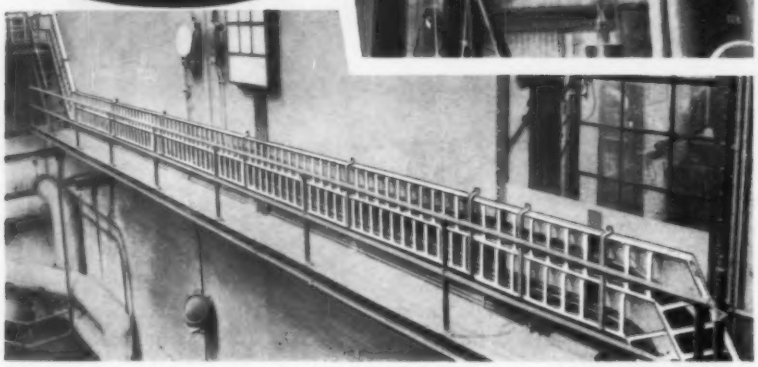
For more facts circle 630 on Reply Card



a new, superior system of CABLE and TUBING RACE WAYS...

Globetray
PAT. PENDING





A completely engineered system of cable ways, production produced and die formed for uniformity with up to twice the strength of ordinary trays, by actual laboratory tests. The universal splice plate joins all parts through the side channels only. All curved fittings are joined at the end of the radius (no tangent material is required) permitting continuous curves. This feature provides greater flexibility of application in tight places and creates an endless variety of combinations for a simple solution to any design problem of change of direction or elevation with a complete set of standard fittings.

Comes in 6", 12", 18" and 24" widths, in standard 12' lengths to further speed up installation time. Cable way can be cut to length at any point—insides and bottom always smooth—all sections punched for easy installation—perfect fit at all times. Neat, clean and uniform in appearance.

Globetray
THE GLOBE COMPANY

EASY TO INSTALL • SAVES TIME • SAVES ON MATERIAL
GALVANIZED • NO MAINTENANCE PROBLEM

106

Write for new complete catalog. Distributors in all principal cities. Contact the Grip-Strut distributor under "Conduits" in the classified telephone directory.

PRODUCTS DIVISION The GLOBE Company
4016 S. PRINCETON AVE. • CHICAGO 9, ILL.
For more facts circle 631 on Reply Card

NEW PRODUCTS

(Begins on page 148)

mounting. With the kit, 200-amp 2ST or 3ST tilting insulator switches can be converted to either 400 or 600 amp. Switches rated at 400 amp can be increased to 600 amp. The conversion is possible because each of these switches—except for the jaw assembly—is designed to meet NEMA standard for 600 amp. The ST switches use multiple berylium copper jaw contacts—each rated at 200 amp. Uprating a switch from 200 or 400 amp is done by mounting additional 200 amp jaw contacts on the pre-drilled jaw terminal plate. Switches are available in voltages from 7.5 to 34.5 kv. I-T-E Circuit Breaker Co.

77—STEAM CLEANER is low-priced, portable unit

Model 200 heats, cleans, sterilizes and de-ices. Flip of ignition switch starts automatic operation of the cleaner, and it reaches 100 psi full operating pressure in 3 min. Output

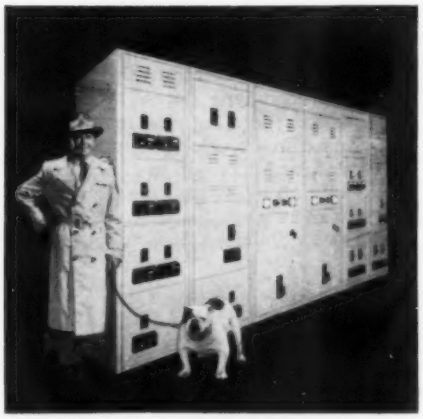
is 200 gal of water or mixed solution per hour. Built-in, self-mixing solution tank has 14-gal capacity—enough for about 4-hr continuous running. It has pressure atomized burner (forced draft) system, continuous spark ignition and spaced and baffled heating coils to provide efficient combustion and heat transfer—over 380,000 Btu per hr. Safety switch gun handle shuts steam off when trigger is released, permitting job interruptions or delays without shutting off entire unit—is resumed by squeezing trigger-action handle. Natural gas- and fuel oil-fired units available. Vapor Heating Corp.

78—CONTROL SYSTEM improves grinder operation

Varidyne Grinder Control, designed to increase versatility of grinders and lengthen the life of their wheels, employs a standard three-phase a-c drive motor operating at variable

Type-50 Switchboards...

custom-engineered power control at standard prices



BULLDOG TYPE-50 SWITCHBOARDS have proved their dependability and economy in hundreds of installations. Switch and fuse units are available in capacities of 30 to 4000 amperes. I-T-E Circuit Breakers are available in capacities up to 4000 amperes.

Take advantage of Type-50 economy! BullDog Type-50 Switchboards will provide your plant with full power, maximum protection, positive switching . . . encourage economical plant operation. And you get the custom-engineered Type-50 Switchboard at standard prices!

Have your nearest BullDog field engineer analyze your present electrical system. He can recommend the type, combination and arrangement of units needed to handle your increased power needs. BullDog engineers will then custom-tailor a switchboard to your specific requirements. The use of standardized parts in Type-50 Switchboards assures uniform high quality . . . time-tested dependability . . . top performance.

For complete details about Type-50 Switchboards consult your electrical contractor or BullDog field engineer or write BullDog direct.

© BEPCO

BULLDOG

BullDog Electric Products Company, Division of I-T-E Circuit Breaker Company, Detroit 32, Mich. *BullDog Export Division:* 13 East 40th St., New York 16, N.Y.
In Canada: BullDog Electric Products Co. (Canada) Ltd., 80 Clayson Rd., Toronto 15, Ont.

HEAT BETTER ELECTRICALLY

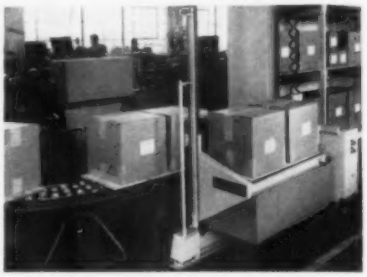
For more facts circle 632 on Reply Card

(Begins on page 148)

speed. The system consists of manufacturer's Varidyne power unit and a slave motor; it is claimed failsafe and to eliminate the possibility of wheel overspeed. According to company, this control automatically compensates for wheel wear by increasing the rpm of the grinder wheel as it wears—maintaining constant surface speed regardless of wheel diameter. With this control system, the grinder wheel rpm may be set at the power unit to meet surface speed requirements of a particular metal, it is noted, and the system automatically maintains constant surface speed in relation to any adjustment made at the power unit. Bulletins F-1952 and F-1910 give data. U. S. Electrical Motors Inc.

79—STORAGE SYSTEM is mechanically operated

The Retriever is a floor-to-ceiling storage wall that comes to life at the touch of a button for delivery of parts of materials anywhere in a plant. This mechanical storage system is made up of an electrically operated traveling carrier, steel storage drawers, and a compact loading or transfer station. The carrier can handle loads brought to the transfer station by conveyor, rollers,

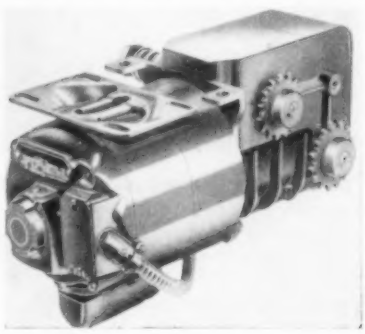


fork truck, or specially designed storage and transport units. Materials to be stored can be on skids, or pallets, in bins or trays, etc. At the touch of the electrical control, the Retriever picks up the load to be stored, transports it horizontally and vertically to desired area in the storage wall, then rolls it into a protected drawer or compartment. Retrieving of the load in the condition in which it was delivered to storage and transportation to work areas or shipping platform is also accomplished automatically.

Tiers of drawers can be added horizontally or vertically to the storage wall, or a unit can be fitted into limited space beside a press operator. Virtually any item from trays of parts to heavy-duty electric motors can be handled, with storage of up to 4000 lb in a single compartment, it is noted. Dimensions of compartments can be tailored to requirements. Triax Equipment.

80—DOOR OPERATOR has some new features

Model L Electric Operator, for overhead-type doors, is announced as incorporating new features at no increase in price. It now operates standard doors up to 19 ft 2 in. wide with up to 240 sq ft area, an increase of more than 50 per cent over previous limits. A low-voltage control



MUELLER BRASS CO. PVC

(POLYVINYL CHLORIDE)

RIGID PLASTIC PIPE AND FITTINGS

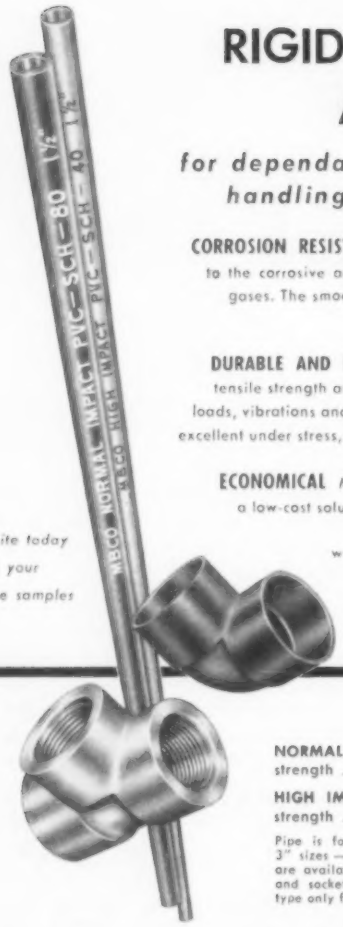
for dependable, low cost chemical handling and industrial piping

CORROSION RESISTANT PVC pipe and fittings are immune to the corrosive action of most acids, alkalies, liquids and gases. The smooth interior walls minimize the build-up of deposits, assuring unrestricted flow.

DURABLE AND DIMENSIONALLY STABLE PVC has high tensile strength and the durability to withstand heavy shock loads, vibrations and rough handling. Dimensional stability is excellent under stress, impact and moderately high temperature.

ECONOMICAL MUELLER BRASS CO. PVC products provide a low-cost solution to corrosion problems . . . lightweight for fast, easy handling . . . rugged, long wearing, no need for frequent replacement. Either threaded or solvent cemented piping systems can be readily installed.

Write today for your free samples



C-103

NORMAL IMPACT PVC — good impact strength . . . maximum chemical resistance

HIGH IMPACT PVC — maximum impact strength . . . high chemical resistance

Pipe is fabricated in 20' lengths; ½" through 3" sizes — I.P.S. schedules 40 and 80. Fittings are available in ½" through 3" sizes; threaded and socket-type for schedule 80 and in socket-type only for schedule 40.

MUELLER BRASS CO. PORT HURON 50, MICH.

Polyethylene pipe and plastic fittings, copper tube, valves and fittings

For more facts circle 633 on Reply Card

Hall Industrial Water Report

VOLUME 6 NOVEMBER 1958 NUMBER 6

From Kerosene to 100 Octane

The cat crackers of today's oil refineries bear little resemblance to the batch stills of yesteryear. But the old and the new do have one thing in common—water problems. Treatment of water for boilers has become more critical because of higher pressures and ratings and greater necessity for avoiding interruptions in production. The same is true of service and cooling water treatment. And waste water problems are becoming more acute because of the pressure to conserve water and clean up our lakes and rivers.

Hall Laboratories engineers have been working with water in refineries as well as in other industries for more than thirty years. They are ready to help you with all your water problems.

Sweetening Sour Water

Deposits formed so rapidly in the sour water deodorizing tower at a Canadian oil refinery that chemical cleaning was required every month. Each cleaning job cost $600.

When he learned of the problem, Hall engineer J. S. Sullivan recommended the use of Calgon and Hagan Dispersive. The cost of these chemicals would be only a fraction of the cost of chemical cleaning.

After treatment was started the tower operated without any indication of deposit formation and inspection was postponed for three months. When the tower was inspected, Sullivan and the operating men were gratified to find it clean.

Failure in Sixteen Days

A Northwestern oil refinery installed two boilers, and a hot process lime-soda softener to treat the hard, high solids feedwater. Operation was started without phosphate conditioning of the boiler water and sixteen days later one boiler was out of service with ruptured tubes as a result of scale formation.

In response to the call for help a Hall engineer left for the plant immediately. He found that plant operation depended upon keeping the remaining boiler in service. This seemed doubtful because a peek into the furnace revealed overheated spots on many tubes, a literal red light warning of insulating scale within them.

There was no time to start with a low phosphate feed and to gradually build it up so as to avoid rapid loosening of scale and possible tube blockage. Full phosphate conditioning was started at once. Then the Hall engineer had to sweat it out. Would there be tube trouble? Would carryover occur because of high concentrations? Fortunately, neither occurred. Within 24 hours the overheated spots disappeared and everyone relaxed.

Without proper conditioning of the boiler water, tubes failed in sixteen days. Following the establishment of desirable conditions many years passed without further difficulty.

Saving by Wasting

A petrochemical plant used well water for cooling in once-through services which required colder water than the cooling tower could deliver. Practically all of the well water was then discharged to the cooling tower system as make-up. Since this was far more water than was actually required for make-up, the amount of blowdown from the recirculating cooling system was about four times what it should have been.

Treatment of the recirculating cooling water for corrosion control involved the use of sulphuric acid, Calgon® and Coraid.® Hall engineer S. R. Osborne pointed out that the excessive blowdown was resulting in the wastage of large amounts of chemicals—more than $60.00 worth a day. He recommended that this be saved by discharging to the sewer all of the well water not actually required for make-up to the recirculating cooling system.

In most plants Hall engineers are looking for ways to save money by reusing or recovering cooling and waste water. In this case the plant could save about $22,000 annually by wasting rather than recovering once-through cooling water.

Pitted Gauge Glasses

A very common problem often puzzling to boiler operators is the internal wastage of glass above the water level in gauge glasses. Water level visibility is impaired and sometimes the glasses are weakened to the point of failure.

When this problem was first referred to Hall Laboratories years ago, study by the Hall research staff revealed an interesting process of corrosion.

Steam is continually condensing on gauge glasses above the water level. The hot, pure water slowly dissolves the glass. Sometimes dissolved silica reprecipitates as an opaque deposit which imparts a frosted appearance to the glass.

There is no way to modify boiler water treatment to prevent or control the trouble. When flat or prismatic glasses are affected replace them with mica-backed flat glasses. When tubular glasses are involved, try to obtain a more resistant glass.

Free Copies of Water Lecture Available

A limited number of free copies of "Your Most Important Raw Material," the Edgar Marburg Lecture by Dr. Everett P. Partridge, are now available. For your copy or for information on how the Hall System can help solve your particular water problems, write, wire or call address below.

Water is your industry's most important raw material. Use it wisely.

HALL LABORATORIES

DIVISION OF HAGAN CHEMICALS & CONTROLS, INC.
HAGAN BUILDING, PITTSBURGH 30, PENNSYLVANIA
DIVISIONS: CALGON COMPANY; HALL LABORATORIES
IN CANADA: HAGAN CORPORATION (CANADA) LIMITED, TORONTO

Hall Laboratories—Consultants on Procurement, Treatment, Use and Disposal of Industrial Water.

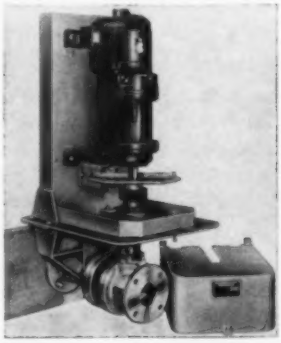
For more facts circle 634 on Reply Card

(Begins on page 148)

system has been added as standard equipment. Any number of push-button controls can be connected in parallel, and radio control can be installed. In addition, a safety switch is available which requires continuous finger pressure to close the door but opens on single contact. Either a ⅓-hp 115-v 60-cycle single-phase a-c motor or ⅓-hp 220-v 60-cycle three-phase a-c motor is available—both more powerful than the motor previously used. Bulletin F5685-2 describes the Model L. Barber-Colman Co.

81—LIQUID VALVE closes when the power fails

For remote control operation, this heavy-duty valve is opened and closed by a built-in electric motor. A fail-safe mechanism is incorporated to close the valve immediately should a power failure occur, says manufacturer, and the valve is practically maintenance-free. This is attributed to such design features as a torque-type motor arranged to operate to a stall in both open and closed positions so that no limit switches are required; a floating bronze valve ball, hard chrome plated to resist scratching and pitting; and a resilient synthetic rubber seat, wiped clean each time the valve is opened or closed. Water turbulence and the resulting added friction loss are said to be eliminated because the full round port area does not change the water stream shape as it passes through the valve. Two standard sizes are available. Model MV-1000 is for 3-in. pipe, and Model MV-2000 is for 4-in. pipe. Bulletin A-28 gives data. Gemco Inc.

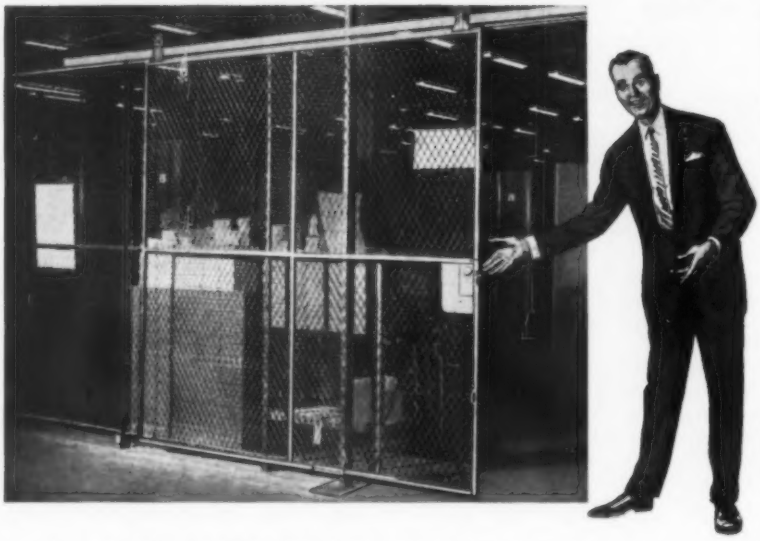


82—BATTERIES boost truck power and economy

Increases in the power capabilities of electric industrial trucks are claimed possible with the Exide-Ironclad line of high-capacity storage batteries. Four new models in the line provide up to 45 per cent more power in a given battery container, it is noted, and incorporate new armored porous tubing. The new batteries, two of them for new style industrial trucks, are reported to offer these operating advantages: (1) Increase in amount and variety of workload handled per shift by existing trucks. (2) Reduction, in some case, in the physical size of battery used on existing equipment — with savings in battery weight. (3) Reduction in frequency of charging of truck batteries in some applications. (4) Increased capacity per unit of battery volume permits standardization on fewer battery types.

The four new types include two designs for low-silhouette and straddle types, and two conventional truck models which replace four previous types. The full line of batteries now cover 106 sizes, with nine to 33 plates per cell, capacities from 136 to 1800 amp-hr, at 6-hr rate of discharge. Exide Industrial Div., The Electric Storage Battery Co.

Inexpensive to Buy — Simple to Install — Easy to Maintain



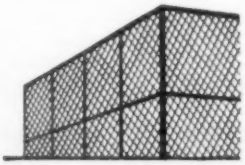
Fact is, Phoenix Wire Mesh Partitions are economical from *every* standpoint. Your initial investment is held to a minimum because Phoenix can meet most any partitioning need from standard stock, and these, of course, are manufactured in low-cost production quantities (custom enclosures, incidentally, cost very little more). Then, there's installation and, frankly, it's so simple it can be handled on a do-it-yourself basis. Phoenix will, however, install anywhere in the U.S. Maintenance? Hardly a factor. An occasional dusting, a paint job from time to time and if somebody runs into it with a truck, the damage may be sufficient to warrant replacing a section . . . but beyond this wire mesh is virtually maintenance-free. Lasts for years and years, too, so look into it *today*. Send for a copy of Phoenix Bulletin #58 now!

SINCE 1885 ONE OF THE NATION'S LEADING MANUFACTURERS OF WOVEN WIRE PRODUCTS

PHOENIX WIRE WORKS, INC.

1958 E. KIRBY • DETROIT 11, MICHIGAN

Telephone: WAlnut 2-4520



For more facts circle 635 on Reply Card

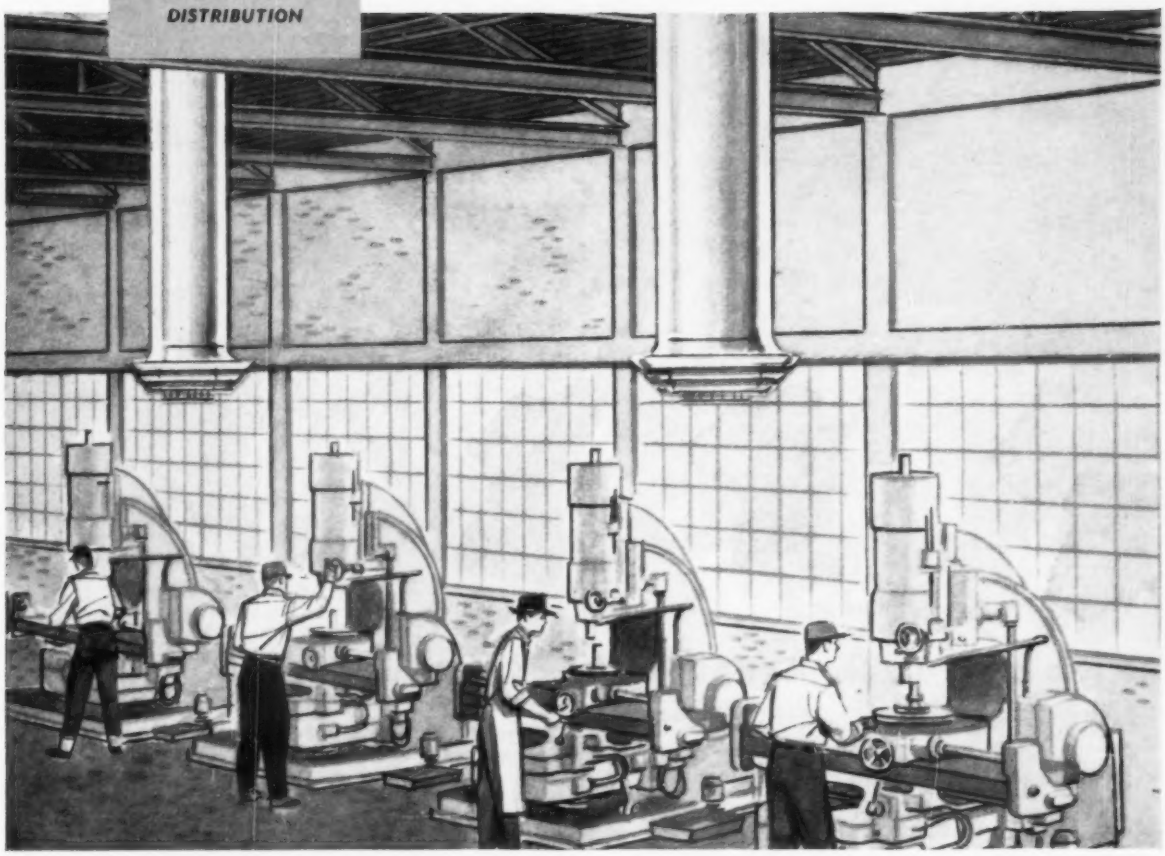
THE MARK OF QUALITY

BARBER COLMAN

Uni-Flo

ENGINEERED AIR DISTRIBUTION

DELIVER FRESH AIR AT WORKING LEVEL WITH VENTURI-FLO INDUSTRIAL DIFFUSERS



Properly distributed make-up air is essential for the health and comfort of manufacturing plant occupants. Failure to provide this comfort factor can result in reduced production and personnel problems.

The new Model BP Venturi-Flo Industrial Diffuser permits air to be piped down to occupancy level — entrainment of stagnant, smoky air in truss space is eliminated. Full range air pattern adjustment permits air to be delivered above the heads of occupants or, to eliminate need for man-cooling fans, directly on occupants. Adjustment is simple *and from the floor* — no need to disassemble the unit. For complete details contact your nearby Barber-Colman Field Office, or write for Catalog F-7722-1.

Only Barber-Colman combines skills in both Air Distribution and Automatic Controls for undivided responsibility.

BARBER-COLMAN COMPANY

Dept. K, 1139 Rock Street, Rockford, Illinois

For more facts circle 636 on Reply Card

This New

RIDGID

4P-J

is the only 2½" to 4" geared threader that's Jam-Proof

It's safe—can't jam and knock equipment around when you thread pipe by power drive. Automatically kicks out after standard thread is cut. Workholder sets to size *before* putting on pipe—other easier work features. See it at your Supply House!

The Ridge Tool Company

Elyria, Ohio, U.S.A.

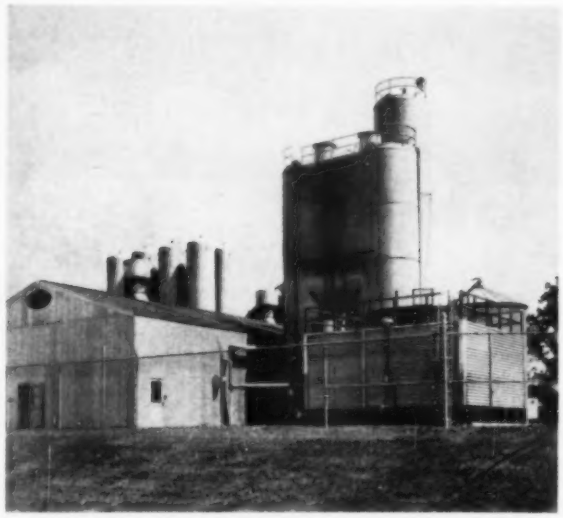
For more facts circle 637 on Reply Card

New Plant Construction

(Continued from page 134)

Muskogee, Okla.—Fansteel Metallurgical Corp., 2200 N. Sheridan Rd., North Chicago, Ill., plans to construct a large plant for the production of tantalum and columbium. Plant will be erected on a 110-acre tract of land on the Arkansas River, near here. Work on the new facility, reported to cost in excess of $6 million, will get under way at once for scheduled completion by 1960. Construction contract has been awarded to Dickman-Pickens-Bond Construction Co., 3712 W. Okmulgee St., this city.

Allentown, Pa.—Air Products, Inc., has announced that work is now under way on the construction of a new 22-million cu ft per month oxygen plant to serve United Steel Corporation's Clairton, Pa., works. Unit will include storage systems for both gaseous and liquid oxygen to meet the intermittent demands of the steel works and to insure continuing oxygen supplies during periods of oxygen plant maintenance. Work is now under way and plant is expected to be in operation by late 1959.



This new 115-ton a day oxygen plant is operated by Linde Company at Armco Steel's Ashland, Kentucky, works. Linde is now building a similar plant at Armco's Middletown, Ohio, works. A sizable volume of the oxygen is slated for enrichment of open-hearth furnace air. Steel conditioning, scrap cutting and maintenance will take balance of gas.

Exton, Pa.—Foote Chemical Co., 18 W. Chelton Ave., plans to construct a large new facility to be used as a research engineering center at company headquarters here. Preliminary plans are being drawn by Voorhees, Walker, Smith & Smith, 101 Park Ave., New York, N. Y., and bids for construction are planned as soon as they are completed. Proposed unit will cost an estimated $2.5 million.

Homestead, Pa.—United States Steel Corp., 525 William Penn Place, Pittsburgh, Pa., plans to expand company's large forging facilities at district works here. Expansion includes installation of seven new vertical heat treating furnaces, a new car bottom furnace, and three large turning and boring lathes. Installations are scheduled for completion by mid-1959.

Philadelphia, Pa.—Scott Paper Co., Market and Markus Sts., Chester, Pa., plans to erect an office building and large chemical and mechanical research laboratory on a 41-acre building site in Tinicum Township, near here. Ground has already been broken for the new facility scheduled for completion by late summer of 1960. Office building, designed

for integrated expansion, will have a floor area of 225,000 sq ft. The research laboratory will contain some 130,000 sq ft of floor space. Project when completed will represent an investment of about $10 million.

Greenville, S. C.—Texize Chemicals, Inc., of Greenville, plans to construct a complete processing plant at Palestine, Texas. Plant will be erected on a 10-acre building site recently selected for the purpose and will be of one-story modern brick and concrete construction. New facility will have a floor area of approximately 75,000 sq ft and the total investment in plant and equipment will be about $1 million.

New Johnsonville, Tenn.—Air Products, Inc., Allentown, Pa., designers and manufacturers of low temperature processing apparatus for gas separation, plans to construct a plant here for the production of liquid and gaseous oxygen and nitrogen. Plant will be completed early in 1959.

Baytown, Texas—Humble Oil & Refining Co., subsidiary of Standard Oil of N. J., 1216 Main St., Houston, Texas, plans to construct a plant here for the production of polypropylene. New plant will be designed for an initial capacity of 40 million pounds per year, with provisions for expansion to 100 million pounds annually.

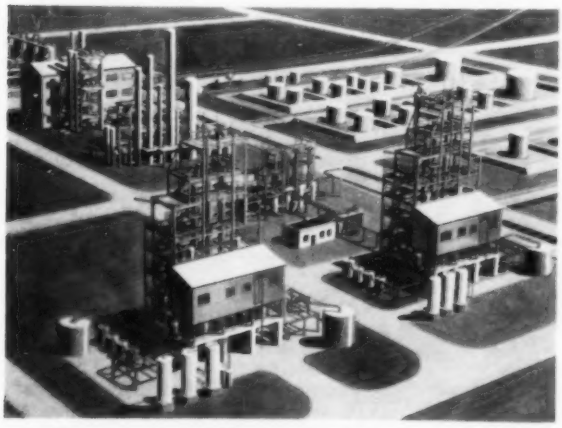
Conroe, Texas—Borden Metal Products Co., 814 Green Lane, Elizabeth, N. J., plans to construct a foundry-type plant for the manufacture of open steel flooring, floor gratings and safety steps. Construction of the new facility, already under way, is expected to be completed by mid-1959, at a reported cost in excess of $500,000.

Houston, Texas—Shell Chemical Corp., 380 Madison Ave., New York, N. Y., plans to construct a phenol unit at company's plant located here. Work on the new unit will begin early in 1959, and it is scheduled for completion early in 1960. Acetone will be produced as a co-product.

Lubbock, Texas—Lewter, Inc., of Lubbock, plans to construct new slaughtering facilities and a cooler building here. Work is already under way for scheduled completion by late 1959. Cost reported to be about $1.5 million.

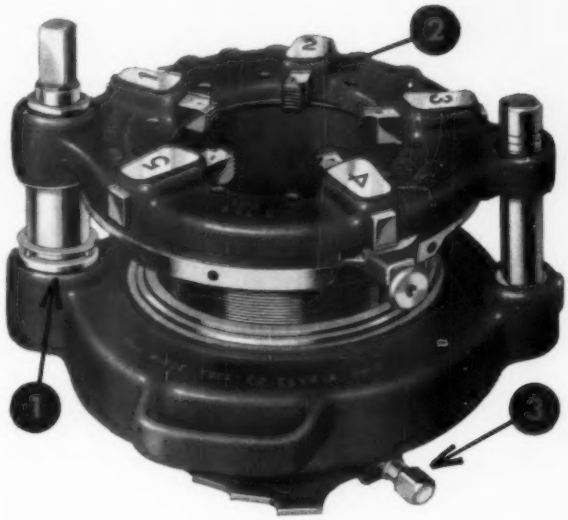
Seattle, Wash.—American-Marietta Co., 101 E. Ontario St., Chicago, Ill., plans to construct a synthetic resin research center here, to cost approximately $1 million. When completed in 1959, center will add more than 30,000 sq ft to the present 8500-sq ft research and administrative building.

Institute, W. Va.—Union Carbide Chemicals Co., division of Union Carbide Corp., 30 E. 42nd St., New York, N. Y., plans to construct a plant here for the production of epoxides and other oxygenated chemicals. Expected to be completed late next year, cost will be about $1 million.



Architect's sketch of Air Reduction Chemical Company's new polyvinyl alcohol resin plant being constructed at Calvert City, Kentucky. Plant is being built by the Lummus Co. of New York, and will be on stream by early 1960.

Now you thread 4", 4½", 5" and 6" pipe with only One set of dies with the New RIDGID No. 161 4" to 6" Geared Pipe Threader



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3. **Plate Type Workholder** sets to size *before* putting on pipe. Just one screw to tighten—no bushings.

What's more the new No. 161 has all the time-saving and proved performance features that have made the RIDGID 65R-TC and 4PJ Threaders the world's most popular. Save time on your large pipe jobs . . . order the 161 from your Supply House today!

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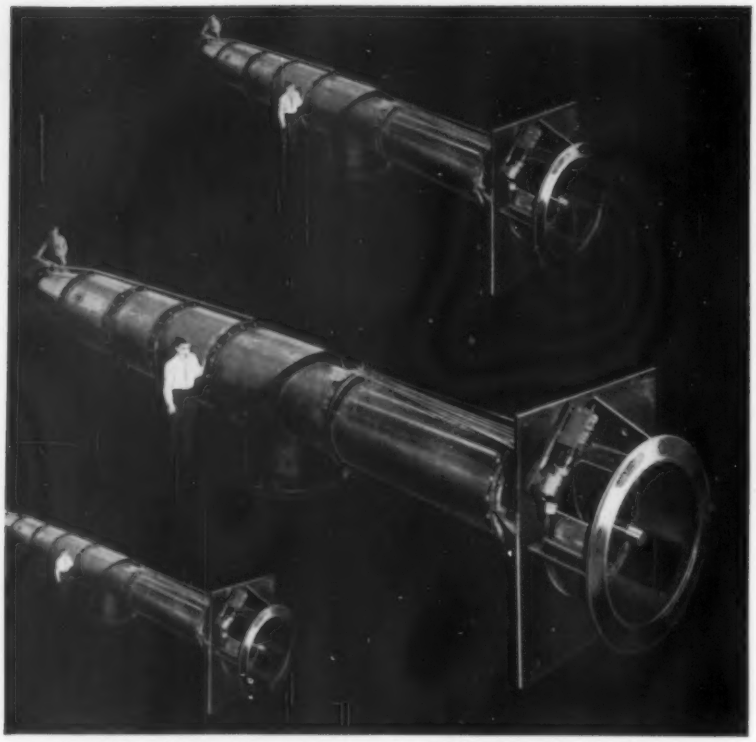

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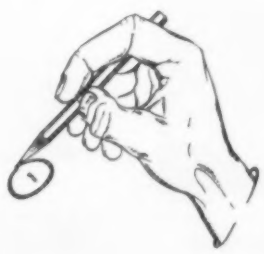
You'll find two postage-free Reader Service Cards on pages 219-220. Use them for ordering product information — just circle item numbers of the products you would like to know more about. You may also use the cards for requesting advertising catalogs.



NEW BOOKS

for the plant engineer

Water Conditioning

BETZ HANDBOOK OF INDUSTRIAL WATER CONDITIONING. Size 10¾ by 8 in. approximately; 255 pp; illustrated; paper bound; fifth edition. Published by Betz Laboratories, Inc., Gillingham and Worth Sts., Philadelphia 24, Pa. Price $3.00.

THIS IS another edition of an informative book which is a good reference work for industrial operations. The groundwork or basic matter appears in the first 196 pages of the text. The remaining portion covers water analyses and their interpretations.

Among the numerous topics treated in the book are the following: lime-soda softening, acid treatment of boiler feedwater; oil removal, steam and condensate line corrosion, slime and algae control, alkalinity, pH, silica, iron, specific conductance, and conductivity correction for ammonia and carbon dioxide.

Cost Control

COST CONTROL THROUGH ELECTRONIC DATA PROCESSING by Phil Carroll. Size 8½ by 5½ in.; 32 pp; paper bound. Published by Society for Advancement of Management, 74 Fifth Ave., New York 11, N. Y. Price $1.50.

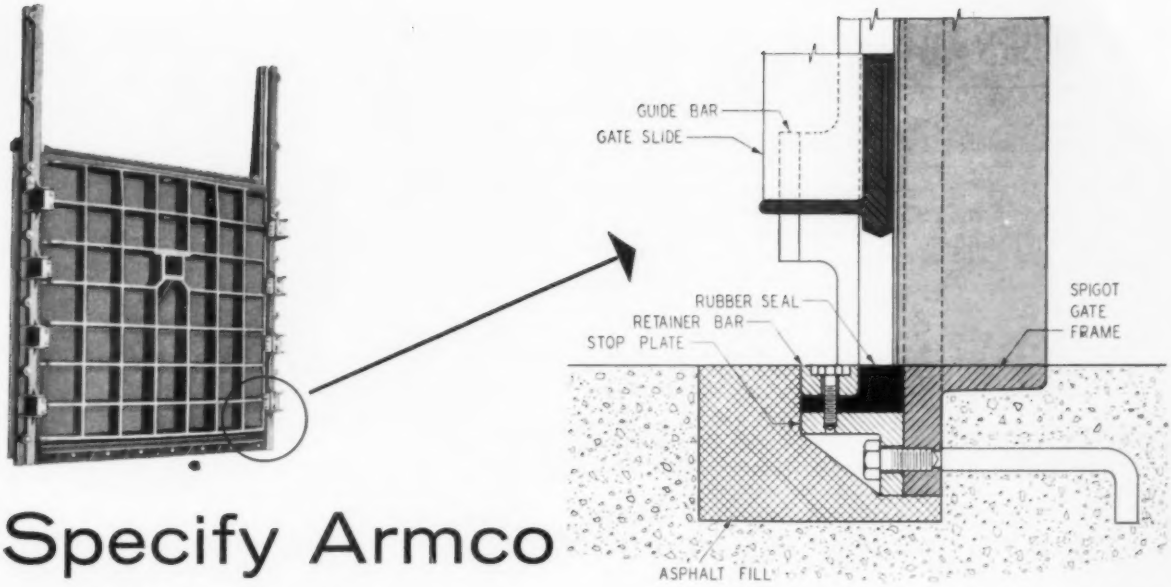
MODERN ELECTRONIC data processing may multiply rather than reduce the costs of a business enterprise unless people who manage and resort to it know "the right questions to ask." Also, if prompt executive action is not taken to correct costs, losses and errors disclosed through electronic data processing, the high speed advantage of EDP equipment will be lost.

The booklet contains practical information pertaining to the use of EDP for cost control. It contains brief comments on such topics as: expense budgets, actual costs, control rates, expense control, study of reports, and information lag.

Aluminum Welding

WELDOR'S TRAINING MANUAL. Size 8¼ by 5¼ in.; 129 pp; illustrated; paper bound. Published by the Kaiser Aluminum & Chemical Sales, Inc., 919 North Michigan Avenue, Chicago 11, Illinois. Price $1.00.

ESSENTIAL factors about tungsten-inert-gas and metal-inert-gas weld-



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The Armco International Corporation • Union Wire Rope Corporation • Southwest Steel Products

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NEW BOOKS

ing techniques are presented in the first section of the publication. Introductory material includes descriptive data about aluminum alloys and their characteristics directly associated with welding.

Step-by-step exercises for the development of welding proficiency are offered in the second and third sections. Exercises include, in part, information on: setting up equipment; striking the arc; the weld pool; horizontal, vertical, and overhead welding. All exercises are illustrated.

Air Conditioning Design

DESIGN OF AIR CONDITIONING SYSTEMS by F. W. Hutchinson. Size 9 by 6 approximately; 336 pp including index; cloth bound. Published by the Industrial Press, 93 Worth St., New York 13, N. Y. Price $7.00.

FULL-PAGE graphical solutions of the most important equations in each chapter are featured in this book. Relatively short discussions precede each group of graphs and instructions on their use through solutions to various sample problems. Calculations will be entirely eliminated in many cases through the usage of the graphs. In other instances the graphs may help minimize mathematical work in design problems.

This book is a complement to comprehensive air conditioning textbooks and handbooks. It contains a selective coverage of principles and design data.

Following the introduction, there are eight additional chapters in the book. Some of the topics treated are as follows: the cooling load; comfort, health and the inside design state; air flow through ducts and fittings; noise as a problem in air distribution and panel cooling design.

Building Construction

BUILDING CONSTRUCTION HANDBOOK. Size 9¼ by 6¼ in.; over 800 pp; illustrated; cloth bound. Published by McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 36, N. Y. Price $15.00

THIS BOOK is packed with information on numerous aspects of building construction; it is a good handbook to have for reference in plant engineering work.

Twenty-nine principal sections in the book deal with such topics as building materials, soil mechanics and foundations, lightweight steel construction, lath and plaster, roof coverings, plumbing and sprinkler systems, estimating building construction costs, specifications, and insurance and bonds.

Each of the sections in the book presents material from a different contributor. Some of the sections include results based on original experience or research of authors concerned with their preparation.

On Polyethylene

POLYETHYLENE by Theodore O. J. Kresser. Size 7½ by 5½ in.; 217 pp including index; illustrated; cloth bound. Published by Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y. Price $4.95.

AFTER A BRIEF history of plastics in general, the book goes into properties, basic chemistry and processing methods for polyethylene. In the remaining portion the publication deals with practical applications of the material in its various forms.

Among several applications of increasing industrial interest is the use of film for vapor barriers, both in building wall construction and in pouring and curing concrete slabs laid on the ground.

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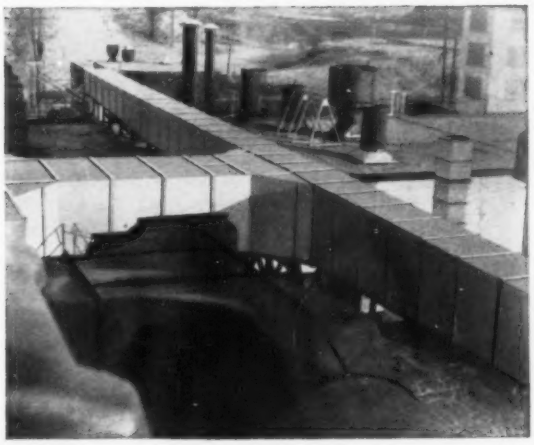
STRONG

Plywood flooring system boosts load limit in office building

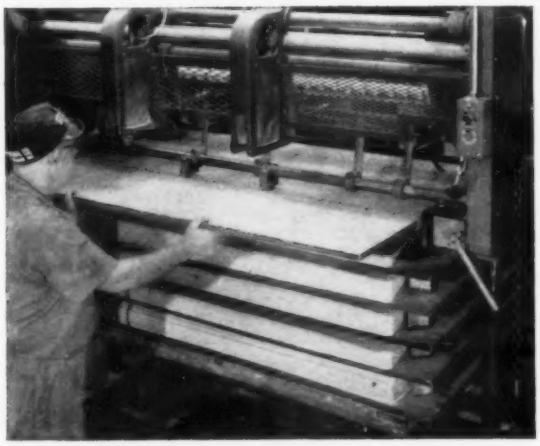
A special flooring system, using stout 1⅛" thick plywood over steel joists helped solve a heavy loading problem encountered when Pacific Telephone and Telegraph Co. decided to mount a battery of huge IBM data processing machines in an older building. Conventional load limits in most office buildings is about 70 lbs. psf. The new plywood floor and specially designed joists boosted the live load rating to the required 200 psf, and permits a concentrated load of up to 1,000 lbs. per machine leg to be transmitted to the floor on large rubber casters resting on steel plates.



DURABLE

Overlaid plywood fume exhaust ducts outlast metal

Switch from metal to overlaid plywood for exhaust manifolds at this giant cellophane plant has sharply reduced maintenance and replacement costs. Installed over four years ago, the ducts have shown no sign of deterioration under continued exposure to sulphuric acid mist, carbon bisulphide, water vapor and other chemical fumes. High density overlaid plywood was used for the manifolds. It has hard, glossy, fused phenolic resin surfaces that are highly resistant to acids and other chemicals. It is virtually impervious to vapor and requires no paint or other protection.



LOW COST

Plywood pallet trays halve labor and storage costs

Fir plywood off-bearing pallet trays in this operation at Myercord Company in Chicago, permit one man to do the work of two and cut storage space in half. The big one-piece pallets are used for storing and handling decals. They're strong, splitproof and light in weight. Previously the company used ¾-inch lumber mounted on 2 x 6 skids with pipe legs to take the weight of individual loads. The bulkier lumber pallets required an additional man at the off-bearing end of the press and consumed twice as much storage space as the new and simple fir plywood pallets.

FIR PLYWOOD

DFPA TESTED QUALITY

Letters DFPA on panel back or edge attest manufacture and inspection under industry-wide quality control program. Individual grade-trademarks are specification guides to the right type and grade and the *right* quality.

FOR INFORMATION about specific plywood uses, or for basic specification-use data, write (USA only) Douglas Fir Plywood Association, Dept. 180, Tacoma 2, Washington.

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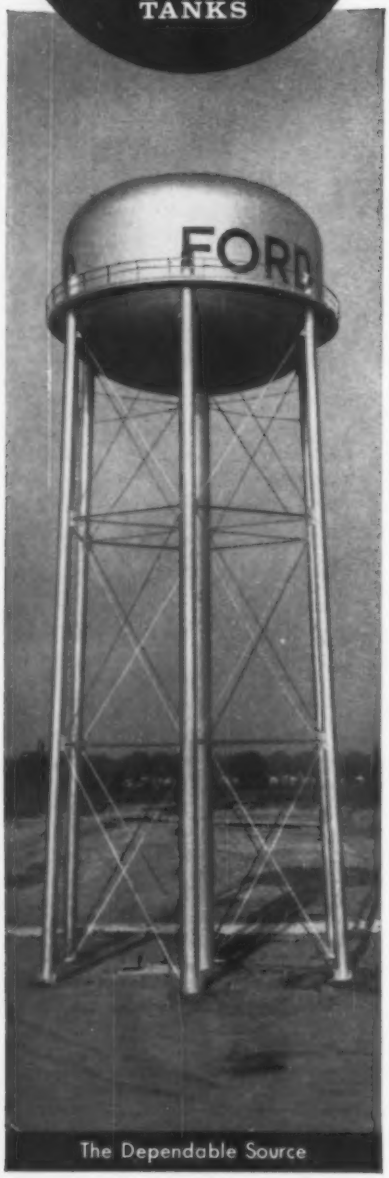

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INDUSTRIAL FILMS

Care of Terrazzo Floors

"YOUR TERRAZZO or Oxychloride Floor . . . And How To Maintain It" is the title of a new 12-minute, full color-sound stripfilm.

The film tells how good terrazzo is made, how to prepare it for finishing, how it is sealed, waxed, and buffed. It also outlines a program for low cost daily maintenance.

Special problems such as how to take care of severe scuffing and stubborn dirt, how to remove stains, how to patch traffic areas, and how to refinish the entire floor are explained in detail. The viewer is warned against use of materials and practices which can cause permanent damage to terrazzo and oxychloride.

Prints of the film may be borrowed for showing from Multi-Clean Products, Inc., St. Paul 16, Minnesota, or from the company's local distributors.

Better Washrooms

PROBLEMS OF MAINTENANCE superintendents responsible for the upkeep of washrooms in industrial, institutional, and commercial buildings are dramatized in a new sound-strip film produced by Scott Paper Company, Chester, Pa.

The 15-minute, full-color film emphasizes that significant reductions can be made in the cost of washroom maintenance and supplies and that employee morale can be improved by analyzing the problems and taking remedial action.

The story is told through a fictitious plant superintendent, named "Dooley," who is plagued by complaints from employees and management for washroom traffic jams, unsanitary conditions, and excessive maintenance costs.

Dooley solves the problems by following recommendations made by Scott's Washroom Advisory Service. Rearrangement of fixtures speeds up the flow of traffic through the washrooms. Employees spend less time and, as a result, can devote more time to production. Better lighting and color schemes, along with the elimination of confusion, improves employee morale. Cost of maintenance and supplies is reduced by a more orderly arrangement of the washroom and systematic scheduling of cleaning duties.

Companies interested in booking the sound-slide film for showings should write to Scott Paper Company, Industrial Packaged Products Division, Chester, Pa., or to any Scott Paper Company distributor. It's called "The Day That Dooley Found Peace."

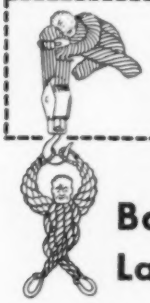
Water, Wells and Pumps

NEW SLIDE PRESENTATION, entitled "Your Untapped Treasure," a graphic story of water resources and pumping techniques, is now available, according to an announcement by Layne & Bowler Pump Company, Los Angeles. This story is available for presentation to companies, business groups, and agricultural, municipal and industrial organizations.

This slide presentation traces water from its sources to the well sites. It describes various water-bearing formations, methods of well-drilling, and pumping techniques. Descriptions of deepwell pumps and their operation is also included in this story. The presentation should be of interest to all groups who are using or working with one of our greatest natural resources—water.

Arrangements can be made through any of the following Layne & Bowler offices: Layne & Bowler Pump Co., 2943 Vail Avenue, Los Angeles 22, Calif.; 230 Dividisero Street, Fresno, Calif.; Room 962-43, Monadnock Bldg., 53 W. Jackson Blvd., Chicago, Ill.; P. O. Box 31, Hastings, Neb.; P. O. Box 1238 or 3412 Pearl Street, Monroe, La.; P. O. Box 892 or 1760 Kimberly Road, Twin Falls, Idaho; 30 Rockefeller Plaza, New York 20, N. Y.; or through the Deepwell Pumps, Inc., P. O. Box 397, Farwell, Texas.

"Look out for the new machine with all the safety features."



Tuffy. Tips On SAFE USE OF SLINGS AND HOIST LINES

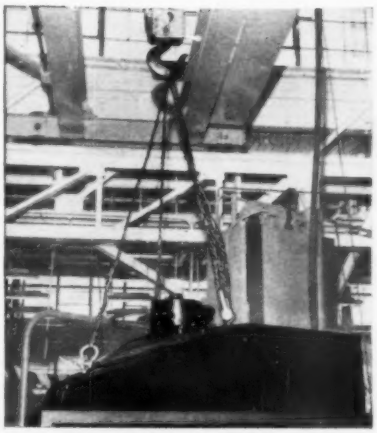
Back Injuries and Strains Loom Large in Industrial Accident Picture

Records for recent years in Illinois, as reported by the State Department of Labor, show an average of 8.9% of all compensation cases closed are for back injuries; another 7.4% for strains and overexertion in lifting or lowering. A total of about one in every six claims are for these two categories of injury.

How can we reduce materials handling accidents? The first answer, of course, is not to use human muscle for the heavy lifting jobs that should be done by the proper size hoist, hoist line and slings.

Here are some other answers:

1. **Keep pull** on sling legs in a straight line. Never shorten legs with knots or I-bolts. If choker and basket hitches are used as slings, safe load limits should be rigidly checked.
2. **Load slings** on the center of hooks; never at their points, except for hooks specially designed for point-loading.
3. **Never use** load hooks that are bent open. They have been overloaded, and may drop loads with disastrous results. Same goes for defective chain blocks. Insist that your men report them at once.
4. **Lubricate wire** ropes at regular recommended intervals, with lubricant recommended by your local oil company engineer.
5. **Break in** new wire rope with care. Don't use it as maximum load capacity until it is broken in.



Bad Use of a Good Sling

Here you see a Tuffy Sling in a poor, off balance hook-up. A Tuffy Type U-9, 3 leg bridle Sling would save time and work far more safely than this improvised hitch with unfitted slings and clevises.

Right and Wrong Ways to Uncoil Wire Rope

RIGHT:

Wire rope in short lengths is furnished in coils. Roll the coil slowly like a wheel and have a nice straight rope before you can say "tuffy."

WRONG:

Uncoiling by laying the coil flat and pulling off the top gives you hard-to-handle, kinky rope. Frustrating and time-killing!

FREE! Tuffy Sling Handbook

Gives complete data on Tuffy Slings — types, dimensions, weights and rate loads. Plus a complete rigger's manual and engineers notebook on wire rope constructions and specifications. Write for your copy now.

Get Safety First With The First Name In Slings...

Tuffy.

Exclusive Tuffy Fabric

The secret of the extra strength and greater flexibility of Tuffy Slings is also the secret of their greater safety. It's the exclusive, patented, machine-braided fabric. You won't find it in any other machine-made sling. It means longer sling life, easier handling and greater capacity for taking deadloads, shocks and impact with safety.

Try to Kink a Tuffy Sling

It's next to impossible. Even if you do succeed in kinking it with the help of a vise, you can straighten out the sling with no material damage to the fabric. Tuffy's resistance to knotting, kinking and looping is extra protection against hazardous weakening of the sling.

Tuffy's Pressed-On Ferrule

Here's another Tuffy feature that adds safety to longer sling life. Applied under tremendous pressure, the steel ferrule literally flows into spaces between wires and strands—giving the eye-splice *full strength of the fabric.* And the streamlined ferrule eliminates snags and projections that might injure hands.

Your Tuffy Distributor is Stocked to Meet Your Needs—Fast!

He's ready with all your Tuffy Slings and Union Wire Rope needs. And ready to help you with any sling or wire rope problem. Get in touch with him now!

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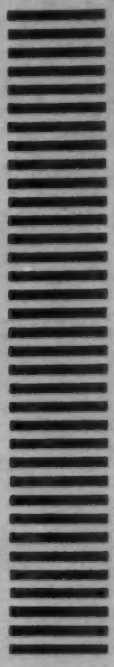

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PRODUCTS

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BULLETINS

(Begins on page 21)

148 Dry-Type Transformer—Details on a smaller, lighter, easier to install dry-type transformer are featured in this illustrated bulletin. Features and advantages are described and tabulated data and rated voltage curve included. Westinghouse Electric Corp.

149 Distribution Transformers—Bulletin S-401-C gives data on two lines of distribution transformers—the conventional and the super-standard single phase oil filled units. Presents a formula for calculating annual operating costs of distribution transformers. The Standard Transformer Co.

150 Dry-Type Transformers—Bulletin GEA-6790, 8 pp, describes new, lighter weight, aluminum wound sealed dry-type transformers rated 300 kva and above. Gives key standard and optional features of the transformers, design variations; and is illustrated with photos, charts, graphs and block diagrams. General Electric Co.

151 Distribution System—A prefabricated system of in-plant electric distribution is described in this booklet. Presents elements that make up this system and shows how these elements fit together to make an efficient, low-cost distribution system. Electric Distribution Products, Inc.

152 Distribution Centers—Bulletin GEC-1355A, 28 pp, provides general and technical information on integral distribution centers, 112½ kva and above, liquid filled and 300 kva and above, open- and sealed-dry. Cites five advantages of the units, gives suggestions for use, and compares three types of transformers. A breakdown of incoming line (or high-voltage) section, transformer section, and outgoing (low-voltage) stationary molded-case feeder-breaker panel is included. General Electric Co.

Postage-free Reader Service Cards make it easy to order bulletins. Cards are provided on pages 219-220.

153 Motor Control Centers—Maximum protection motor control centers with circuit isolation are described in this 32-pp technical design data book. Advantages and features are detailed and technical data required to engineer and specify the motor control centers are included in special fold-out sections which include typical specifications, cell layout tables, starter data, wire tables, and typical cell arrangements. Northeastern Engineering, Inc.

154 Panelboard Planning—Panelboards and their place in the electrical distribution system are the subject of this 16-pp bulletin. Internal components of typical panelboard are illustrated and described, and outstanding features of various designs are presented in detail. Westinghouse Electric Corp.

155 Small Panel Instruments—Bulletin GEA-6678, 6 pp, describes in text, pictures and tables company's "big look" in small panel instruments, d-c and a-c. Cutaway views show features such as self-shielding, and complete information is given on ratings, dimensions, pricing, size and panel drilling plans. General Electric Co.

156 Stationary Batteries—Design improvements in company's line of stationary batteries are reviewed in 8-pp Bulletin 6205. Text, close-up photos and cutaway views demonstrate how design improvements contribute to greater power and extended battery life, lower internal stresses, less frequent addition of water, and elimination of possibility of sediment shorts. Exide Industrial Div., The Electric Storage Battery Co.

157 Lead-Calcium Batteries—Twelve-pp Bulletin CP-540 covers use, design and construction of company's lead-calcium grid batteries for control, switchgear, auxiliary power and other stationary battery applications. Complete cell data are included, as well as curves or discharge characteristics, rack data, and accessory details. C & D Batteries, Inc.

158 Crane Electrification—Aluminum inverted-Y conductor systems are described in 8-pp Electrification Booklet 1. Covers crane and runway electrification for general industrial usage requiring currents of 500 to 1200 amp. The Cleveland Crane & Engineering Co.

159 Mobile Electrification—Catalog 5-58 describes conductor systems designed to meet straight-run requirements of mobile industrial electrification. Parts are illustrated and described, and instructions on splicing are included. Insul 8 Corp.

160 Electrical Metallic Tubing—Product uses, features, manufacturing processes of electric metallic tubing are detailed in 12-pp Bulletin RCP-900. Recommended applications are outlined, and charts are included which detail number of cables that each conduit size will accommodate. Installation information, sizing chart, and suggested specification included. Rome Cable Corp.

161 Rigid Steel Conduit—Advantages of rigid steel conduit in electrical distribution systems are outlined in illustrated 12-pp Bulletin RCP-940. Charts give complete information on dimensions and weights, packaging, cable capacity of conduit. Rome Cable Corp.

162 Cable Supports—Various types of supports to hold cables, instrument piping and multitube are featured in 80-pp Catalog 858. Photos, drawings, diagrams, schematic drawings, specifications, and deflection data are provided. Products covered include expanded metal bottoms, ladder supports, solid supports, channel supports, heavy ladder, structural section, long span section, raceway and Twist-Rack supports. P-W Industries, Inc.

163 Electrical Enclosures—This catalog describes a line of dust and oil-tight electrical enclosures made of sheet steel, including wiring boxes, control panel enclosures, control consoles, push-button enclosures, wireway, and wiring troughs. Features and applications are detailed and specifications and dimensional diagrams are among data included. Hoffman Engineering Corp.

Planning Guides for Modern Plant Lighting

165 Precision Lighting—Twelve-pp Catalog 66 contains detailed information on company's line of industrial precision lighting fixtures. Photos, drawings, and dimensional diagrams are included, as well as other data. Adjustable Fixture Co.

166 Ideas on Lighting—Replete with progressive ideas on use of lighting fixtures, this 82-pp comprehensive catalog offers practical help in selecting and ordering of fixtures. It's fully indexed and arranged for easy reading. Among features is a fold-out page containing technical information normally used in designing lighting layout. Photometrics presented are calculated with Illuminating Engineering Society's interflectance method. Buying information indicates what is and what is not available for fixtures. On many of the fixtures recommended diffusers are shown. A cost-range index on each catalog series serves as a means of rating fixture. This book is available to qualified plant engineers. Please state your job title. Lighting Dynamics.

167 Air-Lighting Systems—Eight-pp Bulletin AD 6765 describes the new Multi-Vent Trofferlite which provides lighting and air conditioning in the same fixture and is applicable to almost any type of building with any type of drop ceiling. The air diffuser (a product of The Pyle National Co.) is built into and concealed within the fixture. Bulletin pictures suggested application procedure and presents data on louvered, baffled and open units. Benjamin Electric Mfg. Co.

INSTRUMENTS, CONTROLS

168 For Process Variables—Bulletin GEA-6792, 12 pp, provides latest descriptive information on company's single-point and multi-point strip-chart recorders and recording controllers, round-chart recorder, recording controller, and circular scale indicator, precision indicator, and control forms. Describes features, contains application data and specifications, shows outline and mounting dimensions, and includes photos. General Electric Co.

169 Steam Meter—"Accurate Steam Metering for 1- to 1½-in. Lines" is the title of 8-pp Bulletin 400-P25. Profusely illustrated with photos, cross-sectional views, dimensional drawings, capacity and accuracy tables; describes features, operation, installation and specifications of the steam meter. Builders-Providence, Div. B-I-F Industries, Inc.

170 For Pipe Flow Measurement—Bulletin 18B describes Bypass Rotameters for measuring rate of flow in pipelines of 2-in. diam and larger. Pre-

BULLETINS

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sents simplified instructions for determining permanent pressure loss across the main orifice and the required straight run of pipe before and after main orifice. Schutte and Koerting Co.

171 Guide to Manometers—Catalog 2008, 24 pp, presents manometers for measuring pressure and vacuum. Covers U-type, well-type (single- and multi-type) and inclined-tube manometers, manometer indicating liquids, and accessory equipment. Product descriptions and specifications are given. Also provided are details on operation, selection tips. King Engineering Corp.

172 High Velocity Equipment—High velocity valve attenuators are described in 24-pp Bulletin K33-A. Technical and factual information on sound control, duct design methods, and proper selection of units is given, and comprehensive graphs, diagrams, and charts are provided. Separate scale drawings and photos of each of five models, showing contiguous construction, included. Connor Engineering Corp.

173 On Industrial TV—Twelve-pp Bulletin 2239 describes major types of industrial television equipment, gives selection suggestions and illustrates these with case histories of successful operation. Fundamental problems of application covered are pertinent to any industry considering use of television as a tool of automation, as part of safety improvement etc. They include its use for stack observation, water level gage observation, flame viewing. Diamond Power Specialty Corp.

EQUIPMENT LEASING

175 Why Leasing—A 20-pp analysis of the advantages of equipment leasing, including several case histories, is presented in this bulletin. Contains extensive charts and statistical analysis of equipment leasing. United States Leasing Corp.

176 MH Equipment Leasing—Methods of leasing materials handling equipment are described in this bulletin: lease option; straight or true leases; and Power Package leases. Gives basic reasons for leasing and includes cost figures showing monthly rental payments per $1000 of equipment. Lewis-Shepard Products, Inc.

PROCESS EQUIPMENT

177 Chemical Process Equipment—Six-pp Bulletin WC-120 details the equipment and services available from the company in the field of chemical processing. Among processes described are ion exchange, sedimentation, filtration and flotation. Equipment for each is illustrated and described. Graver Water Conditioning Co.

178 Storage Structures—Eight-pp Bulletin 207 illustrates storage structures and related materials handling equipment, including glass and epoxy lined tanks, square, round, vertical and horizontal units. Dimensional and capacity data are included along with photos and technical information. Booklet also presents basic information on negative and positive pneumatic systems, rotary valves, bucket elevators, feeders, screw conveyors and bulk trucks. Sprout, Waldron & Co., Inc.

179 Process Equipment—Bulletin G-3B, 12 pp, discusses applications and performance characteristics of Fuller-Kinyon pumps. Airveyor pneumatic conveyors, Fuller-Huron Airslide fluidizing conveyors, rotary compressors and vacuum pumps, horizontal-grate coolers, Humboldt suspension-type preheaters, Lehigh induced draft fans and hot gas washers, positive pressure blowers and gas pumps. Operating principles are explained and typical installations illustrated. Fuller Co.

180 Chemical Process Equipment—Bulletin 16 contains 16 pp of product description and specifications on blenders, vacuum tumble dryers, packaged resin-distillation pilot plants, and process heat exchangers. Using easy-to-read tables and simplified diagrams, the bulletin lists standard dimensions and capacities for the various items in the line. Patterson-Kelley Co., Inc.

181 Drum Dryers—Bulletin 384, 28 pp, describes drum dryers for a wide range of materials of various densities and viscosities. Explains mechanical details of both atmospheric and vacuum dryers equipped with either single or double drums, and illustrates typical industrial applications. Table of specifications and dimensions included. Buflovak Equipment Div., Blaw-Knox Co.

182 Environmental Chambers—Several types of environmental chambers are described and pictured in this 28-pp catalog, along with specifications and pertinent technical data. Major environmental applications are discussed in detail, as in the seasoning of metals, and other applications are listed. Also provided is a list of products in which use of environmental chambers during manufacture results in fewer rejects. Webber Mfg. Co., Inc.

OTHER EQUIPMENT

183 Computer Control—This brochure on digital computer control and data logging describes a digital control computer and discusses process control, data logging, pilot plant and test facility applications for computer control systems. Detailed specifications are listed for the transistorized Model RW-300 for automatic on-line control of industrial processes. The Thompson-Ramo-Wooldridge Products Co.

184 Thermoplastic Polymer—Information on the properties of Penton, thermoplastic polymer, is presented in this 6-pp brochure. Lists mechanical, electrical and chemical properties and describes injection and extrusion molding. Hercules Powder Co.

185 Tumbling Media—This 20-pp bulletin treats kinds of tumbling media for barrel finishing; types of applications; types and functions of tumbling barrels; fixturing and linings for tumbling barrels; compounds and cleansers; do's and don'ts on the use of water; analyses of typical tumbling jobs. Gives case histories on removing paint and breaking corners; removing rust; improving finish; rounding corners; removing burrs; and removing heat treat scale. The Carborundum Co.

Among Recent Bulletins Of Special Interest

187 Insulation Adhesives—Bulletin I-C 58 contains a wealth of information on Insul-Coustic insulation adhesives, weatherproofing, coatings, vapor barriers, and sealing compounds. Included are facts on applications, properties, temperature ranges, coverage per gallon, and suggestions on saving money with these products. Insul-Coustic Corp.

188 On Sprayed Coatings—Engineering data on wire and powder sprayed coatings of metals and ceramics are provided in 8-pp Bulletin 136A. Discusses characteristics, including hardness, tensile and bond strength of various coatings, plus mechanical and electrical-electronic applications. Also covered is spraying equipment. Spraying speeds, material and gas consumption and coverage with various metals and ceramics are tabulated. Metallizing Engineering Co., Inc.

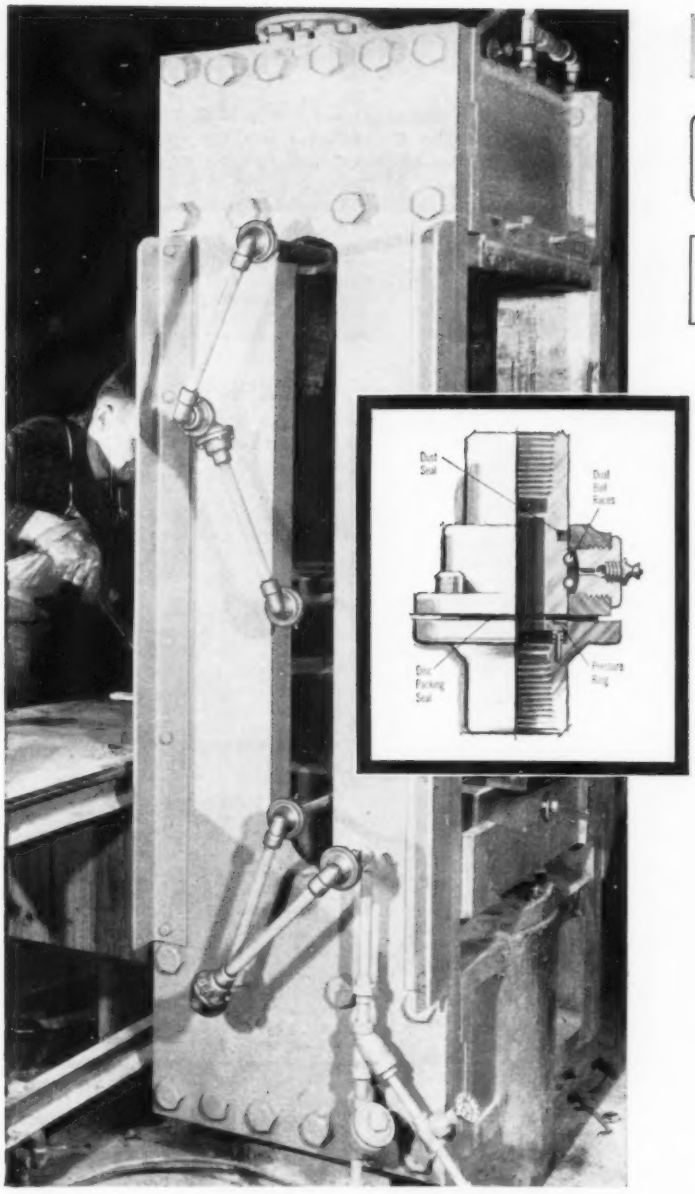
189 Dermatitis Prevention—This little 12-pp booklet cites hazards of epoxy dermatitis and lists 36 practical rules for prevention. Recommendations are grouped as to education of personnel, plant housekeeping procedures, personal cleanliness of workers, ventilation, use of protective creams and clothing. Text is based on experience of epoxy fabricators, suppliers, public health agencies and insurers. Milburn Co.

190 Thermal Snow Removal—Use of Dowtherm SR-1 in thermal snow and ice removal systems is described in this 20-pp bulletin. Covers properties and advantages of the heat transfer medium, and describes a variety of uses other than snow melting. The Dow Chemical Co.

191 Communication System—Featured in this bulletin is a transistorized communication system designed to provide communication between two or more persons or departments regardless of distance or surrounding noise conditions. Operating and equipment features are detailed, as well as economy of installation. Gai-Tronics Corp.

192 Designing in 3-D—This 8-pp bulletin contains instructions for assembling, and description of thousands of parts and materials used in building industrial scale models. Shows how you can build such models quickly and easily, at a substantial cost saving. Scott Industries, Inc.

193 Energy in Color—Again available to plant engineers is this manufacturer's 24-pp booklet on color dynamics —the utilization of energy in color to promote industrial efficiency. Illustrated in full color, this book discusses color



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in general, its effect on human behavior, good seeing conditions, etc. Also describes benefits of color in industry. Illustrations show color dynamics in general plant areas, for machinery, applied to walls and ceilings, to floors and mobile equipment. Use of color for safety purposes is also treated. Pittsburgh Plate Glass Co.

194 Wire Markers—Self-adhesive wire markers are described and pictured in 8-pp Bulletin 130-E. Gives where-to-use information on wire markers made of vinyl-cloth, aluminum foil, all-vinyl, polyester film, oilproof epoxy resin, acetate cloth, glass cloth and others. W. H. Brady Co.

195 Product Guide—This handy little booklet gives information on manufacturer's line of industrial products—general lubricants, greases, diesel lubricating oils, metalworking oils, hydraulic oils, heat-transfer oils, waxes, petrochemicals, spray oils, solvents, electrical oils and others. Sun Oil Co.

196 Magnetic Separator — Eight-pp Bulletin 1051 describes company's Indox V Drum Separator for removal of tramp iron in process industries. Discusses superior strength of ceramic magnet material utilized in the separators. Includes detailed specifications and dimensions, size selection chart. Stearns Magnetic Products.

197 Relief Units—Automatic release for heat, smoke and explosive forces by means of Pyrojector relief units is explained with photos and engineering specifications in this bulletin. Damage prevention advantages are illustrated. The Swarwout Co.

198 Dust Collector—Twelve-pp Bulletin J-616 describes company's Microdyne, a wet inertial type dust collector installed as part of the duct and a fraction of the size of many collectors of comparable performance. Photos show typical installations. Also provided are performance curves, specifications, cutaways showing inner construction, details on a related filter for reclamation or removal of slurry. Joy Mfg. Co.

199 Air Filter—An automatic renewable media air filter is illustrated and described in 8-pp Bulletin B 1400-2A. Contains detailed information about component parts and operation controls, as well as engineering data and maintenance factors. Farr Co.

200 Coating Process — Bulletin 258 describes Kanigen, a chemically deposited nickel alloy coating. Discusses hardness and ductility, frictional properties, abrasion resistance, porosity, adhesion, other properties of the coating and provides table showing corrosion resistance to a wide range of materials. Lists metals and non-metals that can be coated by the Kanigen process. Also covers applications. Kanigen Div., General American Transportation Corp.

201 Pneumatic Transmission Lines —Armortube cable, a flexible, armored, multiple-tube transmission line for pneumatic and hydraulic metering and control systems, is described in Specification G91-9. Tables give sizes, shipping weights, tubing and protecting materials, dimensions, and installation information. Bailey Meter Co.

DATA FILE of literature for the plant engineer's library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. To get these catalogs, circle item numbers of those wanted on postage-free cards provided for you on pages 219-220.

PUMPS, COMPRESSORS

301 General Purpose Pumps—Section B, 36 pp, describes rotary pumps for general purpose use. Explains positive displacement principle incorporated, gives suggestions for selecting proper materials of construction. Application and ordering information is provided on mounted and unmounted small pumps, large mounted pumps, pumps for operations requiring greater sealing, and large, totally enclosed models. Viking Pump Co.

302 Solids Handling Pump—Bulletin P10-B26 describes the principle and effect of a torque-flow pump for all phases of the sewage treatment operation. Stresses non-clog features of this pump. Photos illustrate handling of raw sewage, raw sludge, digester recirculation and grit handling. Western Machinery Co.

303 Continuous Flow Pump—Bulletin 30-C, 8 pp, outlines advantages of company's Moyno pumps which handle a variety of materials—from free-flowing liquids to non-pourable pastes, abrasives, solids. Describes principle of operation, discusses performance, construction, capacities, and includes specifications. Robbins & Myers, Inc.

304 Multi-Stage Pumps—Catalog B-100 describes company's line of vertically split case, multi-stage pumps. Design and construction features are described and performance curves and metallurgical data given. Economy Pump Div., C. H. Wheeler Mfg. Co.

305 Pump Data—Featured in Bulletin 250 are centrifugal pumps, reciprocating pumps, screw pumps and rotex pumps designed for pulp and paper, boiler plants, marine, chemical, food, pipeline, textile and other applications. Typical applications for each pump in the line are listed, as well as range and construction. Warren Pumps, Inc.

306 Low Pressure Compressors—Eight-pp Bulletin A-95 describes a line of low pressure compressors for heavy duty industrial applications. Engineering design features are detailed and advantages explained. Joy Mfg. Co.

307 Air Compression for Industry—This is a 24-pp combination data book and catalog on all types of air compressors from ⅓ hp to 20 hp. Discusses factors to be considered in the use of air for each operation, and points out importance of determining how much usuable air is needed. The Wayne Pump Co.

308 Industrial Air Compressors—Advantages of company's line of industrial air compressors are detailed in 16-pp Catalog 5510. Tables indicating weights, code words and dimensions are included, as well as cutaway views showing design and operation details. Compressor specifications are given, and dimensional diagrams and other material included. Schramm, Inc.

PACKINGS, SEALS

309 Braided Packing — Form AD-131, 8 pp, describes lattice braid packings designed for longer service life and lower maintenance. A table of general recommendations gives essential data, and a table of lengths and weights is included. The Garlock Packing Co.

310 Internal Mechanical Seal—Bulletin CP-575 features Chemical & Power internal seals styles IUA and IUB. They are recommended for use at pressures from 28" Hg vacuum to 100 psi and temperatures from —80 to 500 F. Chemical & Power Products, Inc.

LUBRICATION

312 For Better Lubrication—Advantages of company's lubricants which are specially compounded for lubrication of reduction gear drives are outlined in pocket-sized folder. Features which assure smooth, trouble-free gear drive performance and lower maintenance costs are listed. Gulf Oil Corp.

313 Plug Valve Lubricants—Reference Book 39—Section 5A, 16 pp, describes company's plug valve lubricants and lubrication accessories. Standard lubricant table gives detailed description and extreme temperature range of each lubricant. Suggested lubricants listed. Homestead Valve Mfg. Co.

314 Lithium Greases — This product information bulletin presents manufacturer's six Litholine industrial greases, stressing industry advantages offered by these multi-purpose greases. Gives properties of the greases, general application and performance characteristics. Sinclair Refining Co.

315 Organized Lubrication—Discussed in Vol. XLIV, No. 7, of company's publication, Lubrication, is the matter of organized plant lubrication. Defines this practice and touches upon benefits of an organized lubrication program. Also covers role of management, responsibility for organizing and administering the program. Selection, handling, and application of lubricants are treated, and a table gives simplified lube recommendations for machine tools. The Texas Co.

TOOLS, MACHINE SHOP

316 Industrial Tools—Information on a complete line of industrial tools, including 500 new types and sizes never before offered, is presented in

Still the smallest 800-amp breaker in the business!

GENERAL ELECTRIC KM CUTS EQUIPMENT SIZE AND COST

Panelboards, switchboards and motor control centers are being reduced in size and cost by G.E.'s exclusive new KM breaker—6½ inches shorter and 30 percent smaller than the L-frame, with the same interrupting rating.

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For every circuit protection need, General Electric offers a complete line of circuit breakers and matching enclosures. Plus all accessories including remote operating mechanisms, auxiliary switches, shunt trips, bell alarm switches and new plug-in mounting bases. Call your local General Electric representative to explain G-E benefits for your particular application. Write for Bulletin GEA-6754, General Electric Company, Plainville, Conn.

THE KM IS ANOTHER "FIRST" FROM GENERAL ELECTRIC'S FULL LINE OF CIRCUIT BREAKERS

GENERAL ELECTRIC

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DATA FILE

(Begins on page 224)

120-pp Catalog 57. Included are complete lines of wrenches, socket wrenches, drop forged clamps, tool holders, set up and hold down tools, cutting tools and pipe tools. Photos, drawings and numerous charts aid selection. Armstrong Bros. Tool Co.

317 Pipe Tools—Ordering and application information on Ridgid pipe tools is provided in 16-pp illustrated Catalog 7596R6. Wrenches, cutters, threaders, reamers, vises, and others are pictured and described, also power drives, pipe and bolt threading machines, oilers. The Ridge Tool Co.

318 Masonry Bits—Catalog M B C-56 describes carbide-tipped masonry bits for drilling holes in tile, brick, concrete, granite or any other kind of masonry. Specifications are included, as well as a table giving chuck and shank requirements to adapt to different electric or pneumatic hammers. New England Carbide Tool Co., Inc.

319 Industrial Wrenches, Hand Tools—Tools for production lines, maintenance work and product servicing are featured in a 156-pp Industrial Catalog 58-1. Loaded with pictures and tool facts, book describes in detail the complete line of over 4,000 tools—including chests and roll-cabs, wrenches and sockets of all types, screwdrivers, pliers, pullers, electric impact wrenches, etc. Snap-on Tools Corp.

320 Portable Electric Tools—This catalog, Form 10, features a complete line of portable electric tools including drills, screwdrivers, impact wrenches, magnetic drill presses, sanders, grinders, hammers, holesaws, forged tools, wire wheel brushes, others. The Black & Decker Mfg. Co.

321 Submerged Arc Welder—Advantages of manufacturer's Lincolnweld for submerged arc welding are stressed in this 20-pp catalog. An introductory section explains how arc welding works and how it reduces costs. Three models are described in detail. Also covered are attachments and power sources for a-c and d-c operation. Selection information on electrodes and fluxes is also provided. The Lincoln Electric Co.

322 Hydraulic Jacks, Pullers—Bulletin Hydraulic-56, 16 pp, features company's line of hydraulic jacks and pullers. Prepared as an application guide for using various high-pressure jacking and pulling tools, it contains full descriptions, mechanical specifications. Templeton, Kenly & Co.

323 Data for the Shop—"Fluids and Facts for Metal Working" is a pocket-size booklet of about 44 pp. A section on metal working fluids covers their function and selection, preparation and use of soluble oils and paste compounds, and prevention of dermatitis. Conversion tables, steel numbering systems, machinability ratings included. Standard Oil Co. (Ind.)

FLEXIBLE HOSE, TUBING

325 Flexible Metal Hose—Contained in this 36-pp bulletin is detailed information on characteristics and applications of company's flexible metal hose designed to serve a variety of industrial needs. Includes specifications, list of applications, and photos of the various types of hose available. Typical installations pictured. Pennsylvania Flexible Metallic Tubing Co., Inc.

326 Flexible Tubing — Spiratube A and R—flexible, lightweight, reinforced fabric duct designed for carrying air and other gases, many solids, and liquid at low pressure—are described in 8-pp Bulletin 10C-1. Applications are described, and performance data are included. Flexible Tubing Corp.

VALVES, TRAPS, PIPING

327 Valve Performance Facts — Included in this 36-pp booklet are 32 case histories of cost-saving valve installations. Service applications covered include steam, oil, water, coating fluid, chlorine, phenol, pulp stock, vacuum, others. Crane Co.

328 Corrosion-Resistant Valves — Eight-pp Bulletin 7 contains complete engineering specifications for company's corrosion-resistant valves, as well as photos of individual types in the line. Alloy Steel Products Co.

329 Industrial Valves—Bulletin 507V illustrates and describes company's line of industrial valves for control of air, gas, liquids and solids. Features photos and descriptive detail on a variety of valves, including butterfly valves, wafer butterfly valves, slide valves, others. W. S. Rockwell Co.

330 Silent Check Valves — Bulletin WH-654 and Bulletin 856 feature detailed descriptive and engineering data on company's line of silent check valves for a variety of applications. The bulletins cover center guided, globe type, and a silent gas-air check valve. The Williams Gauge Co., Inc.

331 Gate Valves—Catalog Section A features a line of leakproof gate valves incorporating a double sealing action. A cutaway view showing engineering features is included, as well as tabulated dimensional data, diagrams, and installation and operation instructions. Hamer Valves, Inc.

332 On Steam Traps—Catalog K is an enlarged 48-pp manual and steam trap catalog. New material provided includes open float and thermostatic traps, pipe strainer to 6 in. in steel and semi-steel, and helpful steam pipe sizing tables. Discusses fundamentals of good trapping, trap selection, installation, testing, trouble-shooting, and repairs. Armstrong Machine Works.

333 Manual on Traps — This 40-pp engineering manual is designed to assist in the sizing, specifying and selection of steam traps and other fluid specialties. Includes steam trap selection guide, explanation of four basic types of traps and how they perform their function, four steps to follow in sizing a steam trap, table of factors and detailed instructions on how to select steam traps for over 45 major classes of equipment. The V. D. Anderson Co.

334 Swivel Joints — Catalog G-4R, 32 pp, covers this manufacturer's line of ball-bearing swivel joints as well as other products, including loading racks, manifolding lines, all-metal hose. In addition to providing dimensional and operating data on products, booklet is well illustrated. Chiksan Co.

335 Guide to Couplings—This 26-pp general catalog describes company's quick-connect, quick-disconnect couplings, including a coupling for high pressure applications, for impact in air lines, for low pressure applications, for vacuum and very low pressures, and difficult fluids. Snap-Tite, Inc.

FILTERS

336 Filters, Strainers — Industrial Catalog 1058, 48 pp, provides application and engineering information on company's line of micro-filters and precision strainers. Fuel filters, full flow and by-pass lube filters, dry type air filters, air separators, and metal edge strainers for fuel lube and industrial use shown. Purolator Products, Inc.

337 Intake Filters—Eight-pp Bulletin 100 describes a line of intake filters for internal combustion engines, compressors, blowers, motors and generators. Standard, silencer and ground level installation models are covered, and tables of sizes, and selection chart are included. Dollinger Corp.

FANS, VENTILATING AND AIR CONDITIONING

339 Ventilation Units—Bulletin FM-315, 25 pp, describes basic construction of company's package propeller fans for commercial and industrial applications. Illustrated case histories of typical installations included. Buffalo Forge Co.

340 Air Engineering—Bulletin E-57 is a 24-pp air engineering data file covering engineering and test facilities for propeller fans, specifications, construction, maintenance, and installation. Tables for estimating air-handling requirements, entrance and elbow losses are provided. Aerovent Fan Co., Inc.

341 Air Handling Units—Complete engineering information on company's low pressure sprayed coil and high pressure dry and sprayed coil climate changers is incorporated in 56-pp Bulletin PB-290. Detailed descriptions and illustrations on the all-purpose air conditioners for commercial and industrial comfort and process applications are included. The Trane Co.

342 Power Roof Ventilators—Bulletin 2301 is an 8-pp selection guide to company's low-silhouette line of power roof ventilators. Dimensions, capacity tables, and details on accessories and protective coatings are included. Ilg Electric Ventilating Co.

343 Air-Moving Equipment—Bulletin DB 45-58, 20 pp, contains detailed information on company's line of roof ventilators, bifurcators, axial flow vent sets, and air jets. Bonded performance

Eliminates puff-backs when starting with cold stack.
Compensates for insufficient size and height of stack.
Corrects down-draft condition near mountains.
Corrects down-draft effect from tall buildings.
Permits operation with no stack at restricted locations. Saves cost of tall stacks.
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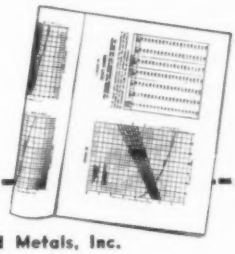

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DATA FILE

(Begins on page 224)

ratings are listed on tables, and dimensional data and specifications included, as well as photos, cutaway views and diagrams. DeBothezat Fans Div., American Machine and Metals, Inc.

344 Industrial Fans—Bulletin 690-A, 12 pp, contains dimensions and application and performance data on direct connected fans for general and system ventilation and power roof ventilators, with air deliveries to 103,200 cfm. Design features and component parts are detailed and typical installations illustrated. Propellair Div., Robbins & Myers, Inc.

345 Fans and Blowers—Bulletin A-108, 16 pp, contains installation, operation and maintenance information on fans and blowers for many applications. Typical centrifugal blower performance is plotted on curve, and other engineering data such as designation of rotation and discharge, motor data, definitions. Castle Hills Corp., Hartzell Propeller Fan Co.

346 Air Conditioning Units—Bulletin 786 contains 54 pp of selection data on air conditioners, including capacities, standard arrangements, dimensions, etc. Steps in selection of basic unit and components are outlined. First pages are devoted to choosing the physical size based on air capacity and face velocity requirements, while succeeding pages concern themselves with heating and cooling requirements, temperature control. American Air Filter Co., Inc.

DUST, FUME CONTROL

347 For Dust Collection—A collection of product sheets providing application suggestions and specifications on Dustkop equipment designed to solve a wide range of dust handling problems is provided in the Series 700 bulletins. Various models are described and illustrated. Aget Mfg. Co.

348 Industrial Dust Control—Bulletin 104, 36 pp, on company's dust filters, gives detailed information about dust control systems and how to engineer them. Includes description of the Roll-Clean Dynaclone dust filter, as well as information, capacities and dimensions for other Dynaclone and automatic continuous dust filters, intermittent filters, others. The W. W. Sly Mfg. Co.

349 Industrial Dust Control—A wide variety of collection methods for industrial dust control is described in 16-pp Bulletin 922. A typical case history is included as well as photos, cutaway views, drawings and capacity data on the various units. Pangborn Corp.

350 Dust Filter—Bulletin F-75 contains 24 pp of information on design, application and benefits of company's reverse jet dust filter. Performance curves of laboratory test runs are included. Also provided are filter comparison chart, photos of typical installations, typical layouts, capacity ratings, dust filter dimensions. The Day Co.

351 Dust Collectors—Operation, construction, versatility and maintenance of company's unit dust collectors are explained in this bulletin. Includes sizes. The Kirk & Blum Mfg. Co.

INSTRUMENTS, CONTROLS

353 Temperature Controls—Eight-pp Catalog CC, on temperature controls and allied equipment for heating and refrigeration, provides information on recording, indicating non-indicating controls; thermometers; bulb installation accessories. The Partlow Corp.

354 Overheat Protection—Bulletin MOPRI-1, 8 pp, describes design and operation features of inherent overheat protectors — small devices built into electric motors to turn power off when windings get too hot. Includes photos and wiring diagrams illustrating operation. Spencer Thermostat Div., Metals & Controls Corp.

355 Meters, Regulators, Valves—Bulletin C-5000, 28 pp, describes and illustrates meters, regulators and valves for a wide range of services. They include gas meters, gas pressure regulators, industrial meters, water meters. Information includes application suggestions, specifications and references to more detailed product literature. Valve section provides operational data, shows major valve patterns in Rockwell-Nordstrom line, explains design features. Rockwell Mfg. Co.

MAINTENANCE

356 Basic-Roofing Information—"What You Should Know About Your Roof" is a 40-pp clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses recommended roofing practices, essentials of good re-roofing job. Johns-Manville.

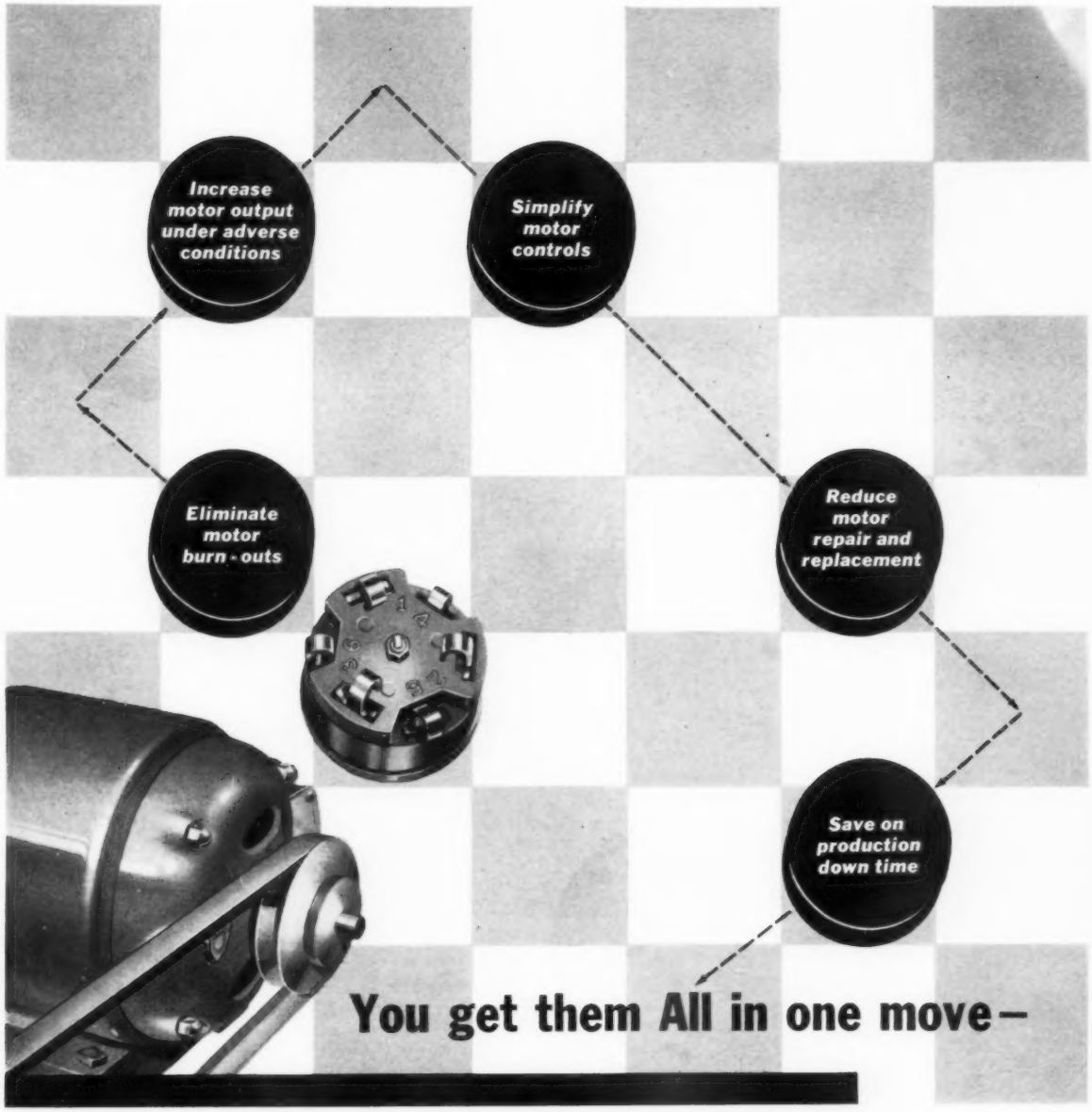
357 Industrial Vacuum Cleaning—Twelve-pp Bulletin 155 B describes both stationary vacuum cleaning equipment and portable industrial vacuum cleaners, the latter in both light and heavy-duty types. Recent improvements in collection and dumping methods are covered, and photos show application to conveying, reclaiming, bench work. Spencer Turbine Co.

ELECTRICAL

358 Fan-Cooled Motor—Illustrations and description of company's totally enclosed fan-cooled electric motors are featured in Bulletin 827. Cutaway views show features. Brook Motor Corp.

359 Immersible Motor—Bulletin 2300 describes applications in which the submerged motor is close-coupled to pumps, agitators and mixers, eliminating long shaft connections, intermediate bearings, couplings and special bases. Cutaway shows engineering features. The Louis Allis Co.

360 Secondary Unit Substations—Bulletin 9004-A, 20 pp, describes lower cost, complete flexibility and space saving of secondary unit substations. Photos and charts of construction are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You get them All in one move—

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Now you can get 3-phase motors fully protected against overheating and burn-out by simply specifying on your purchase orders, "These motors to have KLIXON 3-Phase Protectors."

The advantage to you is that you get maximum work output with minimum, if any, motor outage. KLIXON 3-Phase Protectors safeguard motors against overheating and burn-out caused by the following conditions:

Prolonged overloads • Unbalanced voltage • Stalling Failure to start • Increase in ambient temperatures • Lack of ventilation • Plugging or reversing duty • Single phasing

Get full details from your motor salesmen, then specify motors with KLIXON Inherent Overheat Protectors. The savings you receive more than offset the slight additional cost.

Write for your copy of Bulletin PR-1234. It explains the advantages of 3-phase motor protection.

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Pole buildings are "wrapped around" poles firmly anchored in the ground. This forms a sturdy super-structure that will withstand heavy winds and rough weather. The poles, and all lumber near the ground, are pressure-treated to resist decay and termite attack. Maintenance over the years is negligible.

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DATA FILE

(Begins on page 224)

provided, also standard KVA ratings covering all types of indoor and outdoor units. I-T-E Circuit Breaker Co.

361 Conductor Systems—This 36-pp catalog describes the Insul-8-Bar systems of mobile safety electrification for cranes, monorails and moving machinery. Includes photos and descriptions of typical installations, engineering data, installation procedure, a photo-text list of items that comprise these systems. Insul-8-Corp.

362 Trolley Busway Systems—Bulletin 70 offers help on electrical installations involving cranes and hoists, assembly and production lines, moving test lines and other moving electrical equipment. Covers 225- to 250-amp systems, 100-amp systems and 60-amp systems. Includes special sections on installation planning. Feedrail Corp.

363 Varnished-Cambric Cables—Bulletin VC-56-10M, 22 pp, covers varnished-cambric cables in a voltage range of 600 to 5000 v for single and three-conductor cables braided or lead sheathed. Armored cable constructions in both galvanized steel armor and aluminum armor are shown. Rockbestos Products Corp.

364 For High Voltage Cable—Test results and service records on an improved butyl rubber compound for high-voltage cables are announced in 12-pp Bulletin EB-27. Covers resistance to ozone, operating temperature, high-voltage, dielectric strength, aging, insulating resistance, moisture absorption. Anaconda Wire & Cable Co.

Reader Service Cards for ordering bulletins are on pages 219-220. Be sure to include your name, job title, and company, even if you want bulletins mailed to your home address.

365 Electrical Wires, Cable—Bulletin 1105, Section 1, 16 pp, features a cable selection chart and complete engineering information on company's line of electrical wire and cable. Advantages are detailed. The Okonite Co.

366 Cathodic Protection Cable — Two kinds of cathodic protection cables are described in this informative bulletin. Special advantages of each are listed, and applications and specifications are given. General Cable Corp.

367 Secondary, Service Cable—Bulletin RCP-361, 8 pp, on neutral-supported secondary and service drop cables, provides specifications for both types, including scope of use, conductors, insulation, construction, tests and put ups. Charts show number of strands, insulation thickness, size and type of messengers, current carrying capacity. Rome Cable Corp.

368 Distribution Equipment—Detailed information on company's line of electrical distribution equipment is presented in this 82-pp '58 Marketeer, Catalog M-158. Among equipment described are Electrostrip multi-outlet assemblies, switches, lighting panelboards, power panelboards, switchgear assemblies, and various types of electrical duct. Tables of essential data included. BullDog Electric Poducts Co., Div. I-T-E Circuit Breaker Co.

369 Protective Relays — Featured in 16-pp Catalog 5-020 are time delay overcurrent relays, directional inverse time overcurrent relays, differential relays, instantaneous overcurrent relays (adjustable setting), inverse time voltage relays, auxiliary relays, ac-dc definite time relays, and reclosing relays. For each model, tabular data and photos cover its applications, features, design, settings, burdens at 60 cycles, contacts, and case. Federal Pacific Electric Co.

370 Enclosed Switches—Catalog 83, 28 pp, and Catalog 101, 20 pp, describe enclosed switches for industrial uses. Included are general switches designed for use on either a-c or d-c applications, sealed switches, heavy-duty limit switches, hand operated switches, and maintained-contact switches. Micro Switch, Div., Minneapolis-Honeywell Regulator Co.

371 Hydraulic-Magnetic Breakers—Bulletin 301, 16 pp, describes advantages and operation of company's hydraulic-magnetic circuit breakers. Design and construction features are detailed and time-delay curves, specifications and dimensional data included. Heinemann Electric Co.

372 Protective Equipment Guide — Form SPD is a 24-pp handbook on selection of protective devices for electric circuits, motors, appliances and apparatus, and is based on 1956 National Electrical Code. Besides providing suggestions on how to select right kind of protection, booklet provides wiring diagrams, motor tables, volt loss tables. Bussmann Mfg. Co.

373 Commutator Maintenance—This commutator and slip ring maintenance data file contains information on methods and procedures for more efficient commutation. Individual bulletins cover brushes, sparking, picking, dragging and other troubles, maintenance tools and how to use them, trouble shooting chart and safety. Ideal Industries, Inc.

374 Fuses for All Uses—This revised edition of manufacturer's complete line, Folder 3, includes illustrations and descriptions of fuses for every purpose. Features dual-element cartridge fuses for time-lag in protection against overloads, and delay renewable fuses and renewal links. Economy Fuse & Mfg. Co.

375 Electrical Equipment—Condensed Catalog No. 5 contains 48 pp of descriptive data on company's line of electrical products, including conduit bodies, conduit fittings, connectors, ground fittings and EMT fittings. Dimensional data and features are shown and sizes given. Gedney Electric Co.

376 Flexible Electrical Conduit—Performance and application data on company's line of flexible electrical

Steel company installs a P&H Hevi-Lift Hoist...

doubles pattern-storage capacity, saves cost of new warehouse

Before this Hevi-Lift® Hoist was purchased, storage was limited to the height a fork truck could reach. Space above lay idle. An adjoining building, needed for immediate production, had to accommodate overflow storage.

Now, the P&H Hevi-Lift enables the operator to lift patterns safely to any height, under complete control. A second deck, erected to utilize all the area between floor and ceiling, more than doubles storage capacity. Space in the adjoining building has been reclaimed for production facilities.

Hevi-Lifts prove profitable in many other ways on lifting jobs from 1,000 to 40,000 lbs. Bulletin H-5 tells you more. Write Dept. 205C, Harnischfeger Corp., Milwaukee 46, Wis.

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Note imbedded Nylon plug – locks screw automatically
SEXAUER
EASY-TITE
Note Fiberglas backing – resists closing squeeze

NEW WAY TO

Prevent Faucet Leaks!

★ 9 out of 10 washers are fastened with screws that are TOO LONG or SHORT. The screws quickly loosen; the loosened washers are destroyed thru grind and squeeze of opening and closing faucets.

34 years of research uncovers new solution

★ Now, NEW (Patented) 'Sexauer' SELF-LOCK Monel screws, with an imbedded expanding NYLON PLUG, lock at the required depth AUTOMATICALLY, hold washers FIRMLY! Made of rustproof, non-corroding Monel, heads don't twist off, screw slots don't distort. They are easily removed when necessary, can be re-used repeatedly.

★ Used with NEW 'Sexauer' EASY-TITE faucet washers, they make a combination that outlasts past faucet repairs "6-to-1"! EASY-TITES are made of super-tough, pliable du Pont compound (neither rubber nor fibre) and reinforced, like a tire, with a vulcanized layer of Fiberglas. They resist distortion and splitting from shut-off grind and squeeze.

Hidden costs of faucet leaks!

Faucet leaks are costly! As authenticated by Hackensack, N. J. Water Co. and American Gas Association, stopping just ONE PIN-HOLE SIZE (1/32") LEAK can reduce water waste 8,000 gal. quarterly. If a HOT WATER FAUCET LEAK, water and fuel savings JUMP to over $7.58 QUARTERLY—plus additional savings on MATERIALS, LABOR and costly FIXTURE REPLACEMENTS!

NEW SELF-LOCK screws and EASY-TITE faucet washers are just TWO of the "SEXAUER" line of over 3000 TRIPLE-WEAR plumbing repair parts and Pat'd. precision tools.

A "SEXAUER" Technician in your vicinity will make our NEW 126 page Catalog "H" available. He will gladly consult with you regarding a SURVEY of your plumbing fixtures to determine correct repair parts required and establish reasonable stock levels that avoid both overstocking and shortages—thus providing for efficient stock arrangement and control—all without obligation. WRITE TODAY!

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DATA FILE

(Begins on page 224)

conduit are featured in this illustrated brochure. Specifications and ordering data are included. Electri-Flex Co.

377 Cable Supports—This information folder contains data on company's cable supporting equipment, telling how to install cable supports, as well as giving advantages of cable trough. T. J. Cope Div., Rome Cable Corp.

378 Cable Troughs—This 12-pp catalog offers a simple solution to any design problem of change of direction or elevation with a complete set of standard fittings, horizontal elbows, inside and outside vertical elbows, ties, crosses, covers and many special fastening devices. The Globe Co.

LIGHTING, COMMUNICATIONS

380 Illumination Design Data—Basic reference data on interior lighting installations is contained in 48-pp Manual A-4854, which features a section describing footcandle levels required for each group of seeing tasks. These footcandle levels are then related to many kinds of rooms and areas. Westinghouse Electric Corp.

381 Architectural Floodlighting—Eight-pp Bulletin GEA-6437 illustrates various methods of floodlighting industrial plants, public and commercial buildings and others. Provides information on general purpose heavy-duty floodlights. General Electric Co.

382 Lamps for Industry—Eight-pp Bulletin 88 presents manufacturer's line of lamps for industrial service, indoors and outdoors. These include mercury vapor lamps, weatherproof floodlights, high bay reflector lamps, spotlights, infra-red lamps, spatter-proof lamps, and others. Illustrated with photos, bulletin includes curves indicating candle-power. Radiant Lamp Corp.

383 Lighting Units—Data sheets to be added to Section 30 of company's product catalog are now available. These cover application, construction, installation and wiring of company's lighting units for various duties. Installation and construction details are diagrammed. Day-Brite Lighting, Inc.

384 Lighting Maintenance Tips—Principles and advantages of good lighting practice are presented in this 48-pp lighting maintenance manual. Much useful information has been added to this revised edition, including a guide to trouble shooting fluorescent installations, a section on planning group replacement of lamps, and a section on planning a program for cleaning lamps. Champion Lamp Works.

385 Incandescent Lighting—The 24-pp "Incandescent Lighting Guide Book" features sections on the general advantages of incandescent lighting, the history of incandescent lamp developments, and includes chapters on basic types, bulb shapes, sizes, glass types and finishes, and types of bases. Sylvania Electric Products Inc.

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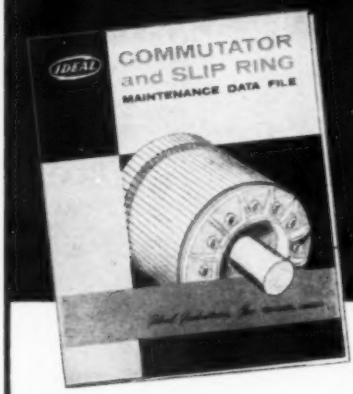
HOW-TO-DO-IT ARTICLES

on Commutator and Slip Ring Maintenance



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TYPE "PC" | EXCHANGER

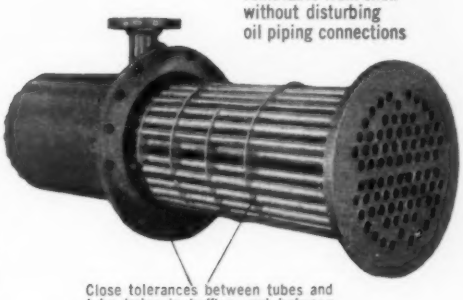
Straight-tube exchanger for oil, water, air or gas

Leak detection holes in retainer ring show leakage from either tube or shell sides (See detail below).

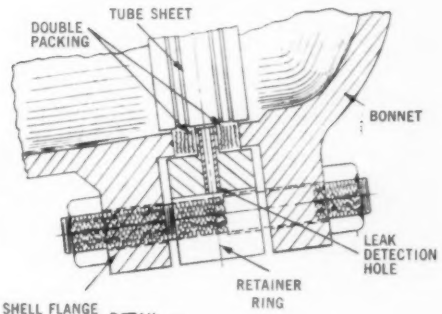
Exclusive "retainer ring" design, available only in Paracoil "PC" Exchangers, **permits shell side pressure test with bonnet removed. No auxiliary equipment or special devices are required to hold tube sheet packing against pressure.** By backing off only one set of nuts, bonnet may be removed without displacing packing or retainer ring. Pressure may be applied to shell side to test for defective tubes or leaking tube joints. With bonnet off, retention studs hold retainer ring and packing in place.

Tubes may be tested, re-rolled, even replaced, without removing tube bundle from shell.

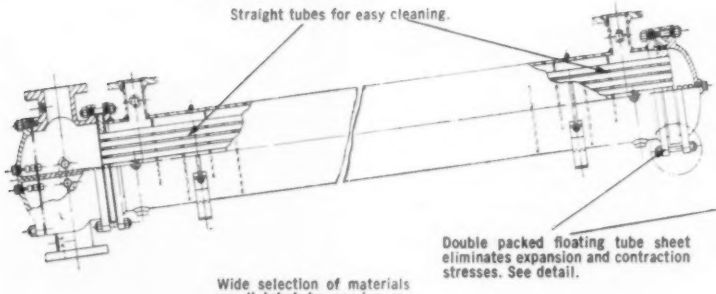
Tube bundle easily removable from shell without disturbing oil piping connections



Close tolerances between tubes and tube holes in baffles, and between baffle periphery and shell, assure maximum heat transfer.



DETAIL — *Section thru floating tube sheet, showing packing and detection hole in retainer ring.*



Straight tubes for easy cleaning.

Double packed floating tube sheet eliminates expansion and contraction stresses. See detail.

Wide selection of materials as dictated by service requirements.

Standard commercial, ASME or Marine Code construction.

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Mixing of shell and tube side fluids due to packing failure is impossible in this Paracoil Type "PC" design. Any leakage from either side, resulting from loosening of bolts or worn packing, escapes through the detection holes. The operating personnel is thus on notice that servicing is required.

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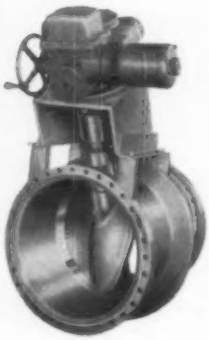

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DATA FILE

(Begins on page 224)

386 Lighting Equipment—Bulletin 2697, 52 pp, contains detailed information on a line of lighting equipment, including floodlights, searchlights, industrial lighting and fixture condulets. Two new items—mercury vapor floodlights and vapor master lighting fixtures—are covered. Crouse-Hinds Co.

387 Signal Equipment—Tips on how to select suitable signals for any specific operations are offered in Bulletin 100. Describes horns, bells, warning lights, other signal equipment. Specifications, photos, wiring diagrams, dimensions, audibility rating charts, electrical characteristics and other data included. Federal Sign & Signal Corp.

CONSTRUCTION

389 Aluminum Building Products—This 36-pp catalog covers company's line of aluminum industrial building products. Cites advantages of aluminum, pictures some installations. Installation data, weights, dimensions and rough-in details are provided on corrugated roofing and siding, V-beam roofing and siding, ribbed siding sheet, perforated corrugated sheet, flat flashing sheet. Aluminum Co. of America.

390 Overhead Doors, Operators — Features and advantages of company's line of Overdoors and electric operators for doors and gates are detailed in 8-pp Bulletin F-8436. Design and construction details are illustrated and described and specifications and installation layouts included. Barber-Colman Co.

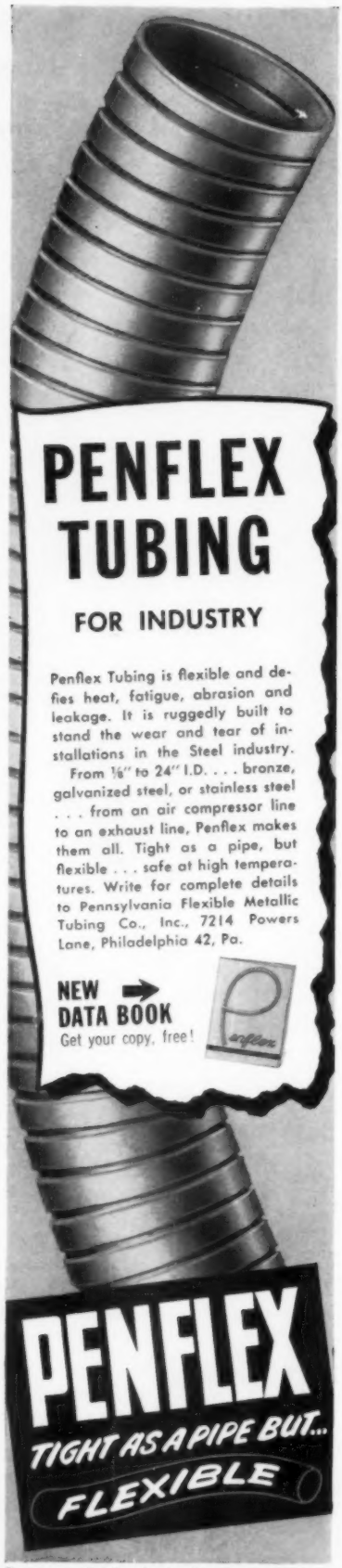
391 Data on Panel Material—How to improve factory methods with Masonite Presdwood is discussed in this 12-pp illustrated bulletin. Advantages are listed and types of presdwood used in maintenance and materials handling are indexed. Which type to use and where are covered. Masonite Corp.

392 Insulated Curtain Walls—Technical Manual 2786 contains description, details and application methods of Gold Bond Asbestostone Panels. Includes specifications as well as photographs and dimensional drawings showing construction details. National Gypsum Co.

393 Steel Floor Plate—Skid resistance and other advantages of USS multigrip rolled steel floor plate are stressed in this illustrated bulletin. Also gives dimensions, data on allowable loads. United States Steel Corp.

394 Non-Slip Flooring — Algrip, an abrasive rolled steel floor plate described as non-slip even on steel inclines, is the subject of Booklet AL-29, 8 pp. Discusses safety features, fabricating. Alan Wood Steel Co.

395 Grating and Treads — Bulletin 2527 is a 26-pp, illustrated bulletin on grating and treads for a variety of applications. Presents descriptions of electro-forged, rivited, rectangular, diagonal, U-Type and T interlocked grating and treads. Tables of safe loads and information on specifying are also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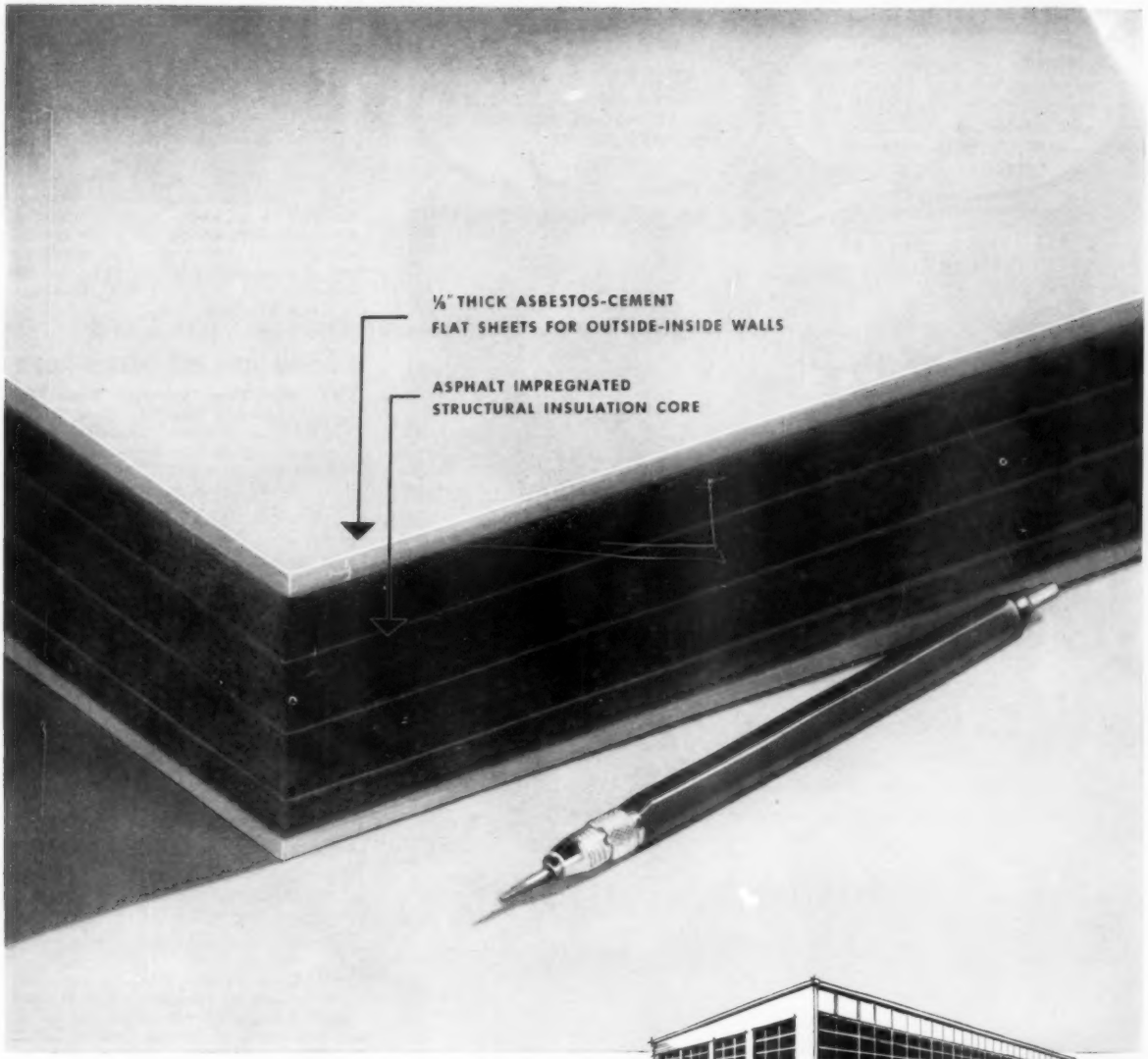

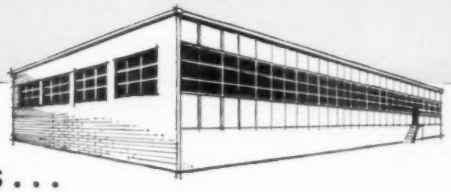

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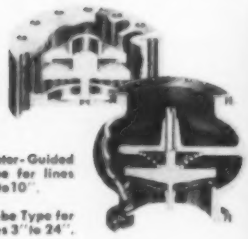

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For more facts circle 660 on Reply Card

DATA FILE

(Begins on page 224)

included, as well as photos of typical applications. Blaw-Knox Co.

396 Underpasses, Conduits—Manual TL-5956 is a 16-pp book explaining practical applications of underground passageways, their design and construction. Condensed data are given, as are drawings and photos. Armco Drainage & Metal Products, Inc.

SLINGS, CHAINS, WIRE ROPE

397 Wire Rope Selection Tips—This 16-pp illustrated booklet, "How To Be A Wire Rope Expert," describes basic principles governing selection of proper rope construction. Describes five factors to be considered and shows how these can be balanced for best possible efficiency regardless of application. Also illustrated is a device called the D/d ratio for determining best relationship of rope size to sheave or drum size. Popular wire rope constructions are described, applications listed. Leschen Wire Rope Div., H. K. Porter Co., Inc.

398 Self-Lubricating Chain—Bulletin SLC-57 describes and illustrates exclusive, oil impregnated sintered bushing design feature of company's self-lubricating roller chain. Engineering data, dimensions and application reports are included. Whitney Chain Co.

Postage-free cards for ordering catalogs are on page 220. You may also use the cards to order literature mentioned in the ads.

399 Drop Forged Fittings—Comprehensive data on company's line of drop forged fittings for wire rope and chain are presented in 40-pp Catalog 950-2. Includes specifications, dimensions, rated capacities and weights. Also announces range of sizes and capacities in many of items listed, as well as new products, including clips. Crosby-Laughlin Div., American Hoist and Derrick Co.

400 Sling Chain Handbook — Illustrated Data Book 100, 32 pp, presents "how to do it" information on sling chains—from ordering to care, use and inspection. Contains diagrams, charts and tables on standard and special styles of sling chains and attachments. Columbus McKinnon Chain Corp.

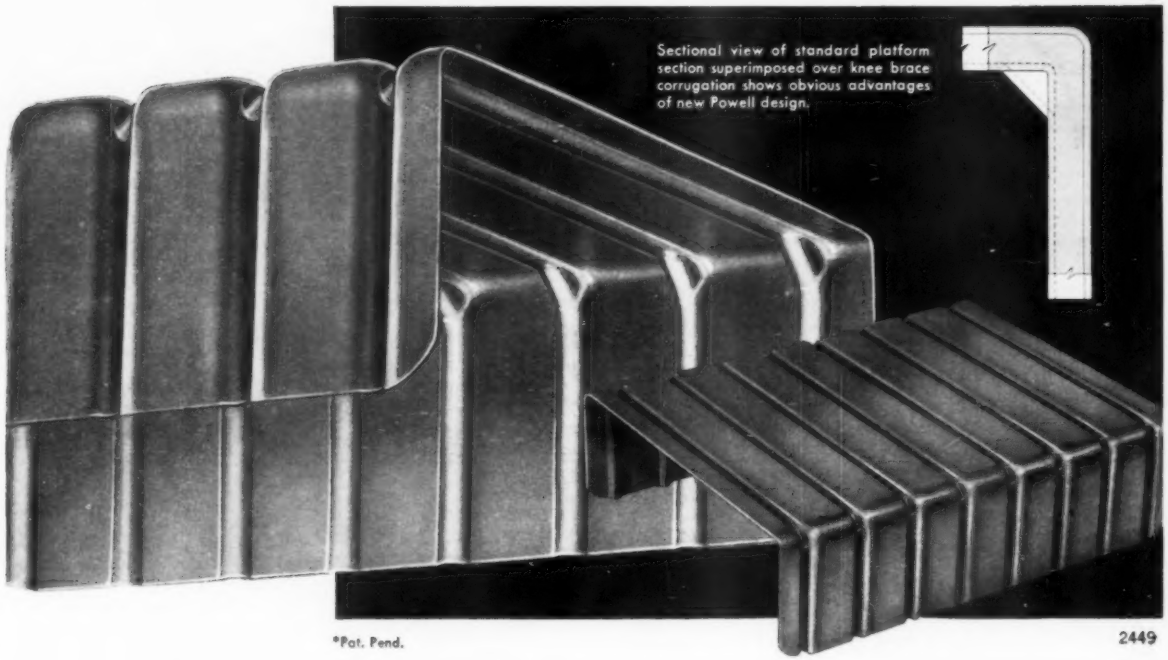
401 Sling Handbook—Form SL-3 is an illustrated 40-pp reference book covering more than 80 subjects on slings and fittings. Included in this revised edition is reference information condensed into handy chart form on sling types, dimensions and rated loads. In addition, section on sling fittings has been expanded to cover fittings not previously shown. Union Wire Rope Corp.

MATERIALS HANDLING

402 For Overhead Handling—Booklet 2008-M, 12 pp, is replete with illustrative material on principal compo-

New SKID PLATFORM* ...BY POWELL

exclusive formed-in knee brace means extra strength, longer platform life—at no extra cost!


Sectional view of standard platform section superimposed over knee brace corrugation shows obvious advantages of new Powell design.

*Pat. Pend. 2449

A new forming concept developed by Powell engineers —a unique integral knee brace that is formed into each corrugation—eliminates common weakness of ordinary platforms—add years of service life to steel platforms *at no extra cost!*

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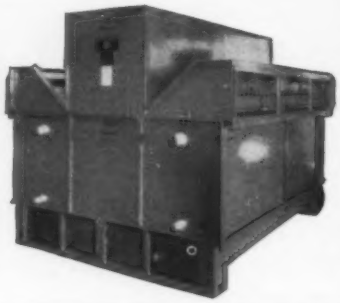

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DATA FILE

(Begins on page 224)

nents of overhead handling systems. Track design and advantages of supporting it flexibly are described, and formulas and figures for comparing various track systems are included. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

403 Traveling Cranes—Motor driven traveling cranes designed to handle a variety of industrial operations are described in 20-pp Catalog 62. Crane specifications are included, as well as clearance dimensions and other data. Reading Crane & Hoist Corp.

404 Electric Hoists — Six-pp illustrated Bulletin 905 describes R&M Type J electric wire rope hoists in capacities of ¼, ½, 1 and 2 tons. Shows complete specifications including mounting options and sectional drawing. Hoist & Crane Div., Robbins & Myers, Inc.

405 Electric Winch—Detailed in this illustrated data sheet are advantages of company's electric winch with automatic brakes and more capacity per pound. General specifications are also included. R. G. LeTourneau, Inc.

406 Trolley Conveyor—Described in 8-pp Bulletin T-58 are features and advantages of company's trolley conveyor for light-duty applications. Specifications and dimensional diagrams are included, as well as installation instructions. Mathews Conveyer Co.

407 Steel Conveyor Belts—"A profitable approach to the selection of steel processing conveyor belts" is the subject of this 16-pp bulletin. Simplified selection, standard specifications, and installation information are included. The Colorado Fuel and Iron Corp.

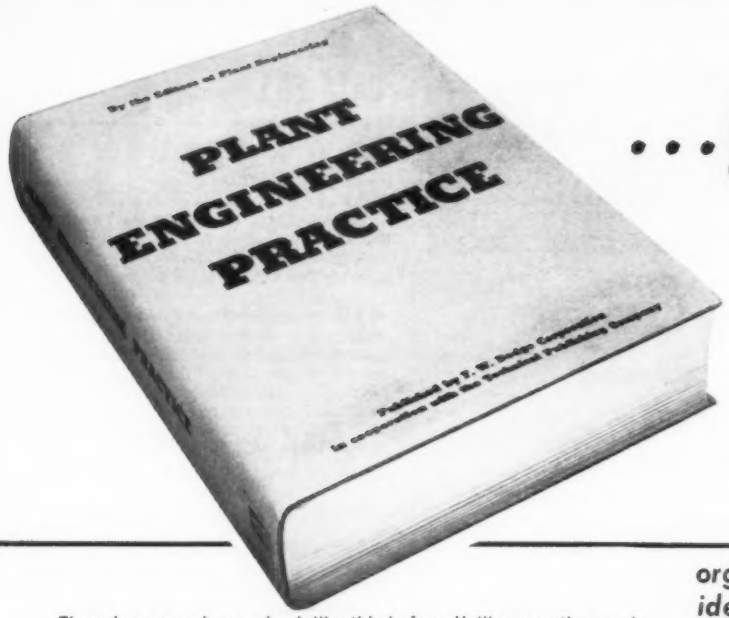
408 Improved Stacking Unit — This bulletin describes a tapered nose stacking container offering wide range of application and many advantages in batch materials handling. Photos show the steel units in storage, transporting, assembling applications. The Powell Pressed Steel Co.

409 Self-Dumping Hopper—Described in Bulletin 260 is a self-dumping hopper for low-cost handling of wet or dry, hot or cold, bulk materials. A variety of standard models are pictured and described and construction data furnished. Roura Iron Works, Inc.

410 Casters, Wheels — This 192-pp manual, Number 60, contains detailed information on a line of casters and wheels designed for a variety of furniture and equipment applications. Dimensional data, specifications and price lists are provided for furniture and industrial casters and wheels, and photos, drawings and diagrams illustrating design and construction features are included. Darnell Corp.

PLASTICS

411 Thermoplastic Sheets—This 8-pp booklet stresses application possibilities for Seilon rigid thermoplastic sheets,



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industrial landscaping, parking lots, traffic, organizing plant and personnel for moving, modular units for plant and equipment layout, modernization.

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subsurface exploration, adding mezzanine and extra floors to existing plant, shoreline construction, prefabricated shop partitions, eliminating TV interference, shielding workers from radiant heat.

3. HOUSEKEEPING AND SAFETY
noise control, fire safety, training company fire department, sprinklers, firedoor mechanisms, fire precautions, medical facilities, driver training, and more.

4. MATERIALS HANDLING
industrial rail systems, conveyors, cranes, fork lifts, cranes, tractor-powered rail systems.

5. MAINTENANCE
selling the maintenance program to management, forms and records, inventory control, vehicle maintenance, work scheduling, lubrication.

6. PAINTS AND PROTECTIVE COATINGS
color, corrosion resistance, safety, speed, design of spraying areas, rollers, special protective coatings – silicone finishes, epoxies, aluminum paint, plastisols.

7. MECHANICAL POWER AND PIPING SYSTEMS
ball and roller bearings, fluid power (including installation, selection of fluids, pumps, valves, accumulators and intensifiers), belt drives, compressed air systems, steam systems.

8. ELECTRIC POWER
dry and oil type transformers, electric motors, other electrical equipment, also installation and selection of ground systems, capacitors, and electric safety precautions and procedures.

9. LIGHTING
emergency installations, mercury, fluorescent, and incandescent systems, maintenance and installation of high ceiling fixtures, including use of overhead cars.

10. UTILITIES
power cable placement, intercoms, water softening, cafeteria design and maintenance, control of drinking water purity, recovery of industrial wastes, handling radioactive byproducts.

11. HEATING, VENTILATING AND AIR CONDITIONING
control against dust, heat, steam, odor, insects, radiation; installation and maintenance of fuel tanks, condensers, hot-water systems, oil burners and cooling systems.

12. QUALITY CONTROL
instrumentation, functions of instruments, dial gauges, use of isotopes and x-ray for quality control.

13. SHOPWORK
working with stainless steel, brazing, working with acrylic plastics, use of disc grinders, immersion heaters, adhesives, tool adaptations.

these are partial contents only

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See Our Catalog in Sweet's Plant Engineer's File

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DATA FILE

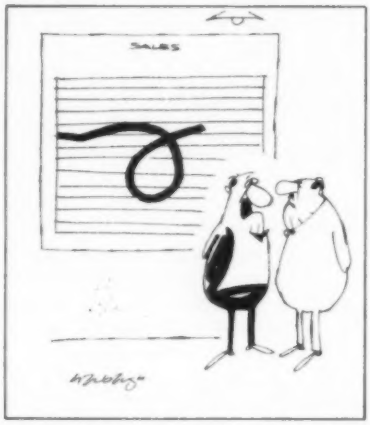
(Begins on page 224)

produced in PVC, copolymer, Styrene, ABS polymer, polyethylene. Photos accompanied by brief text, illustrate Seilon in action in construction field, in the chemical and electrical industry, others. Seiberling Rubber Co.

412 Phenolic Plastics—A primary evaluation of the properties of company's phenolics and the combinations in which they are available, in thermosetting molding materials and industrial and coating resins, is featured in this illustrated bulletin. Durez Plastics Div., Hooker Chemical Corp.

HEATERS, HEATING

413 Fan Heater—Bulletin 109 describes company's high pressure steam fan heater designed to utilize both sensible and latent heat of high pressure steam. A color-keyed diagram illustrates operation. Niagara Blower Co.

414 Unit Heaters—Catalog 157, 32 pp, contains performance and application data on company's line of unit heaters, including design and construction details, dimension diagrams, and tabulated information on steam capacities, conversion factors, hot water capacities, performance factors, and heat transfer coefficients. Modine Mfg. Co.

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415 Electric Heating—Bulletin 975A, 12 pp, outlines advantages of electric heating and describes a number of different methods, such as radiant, convection, radiant and convection and forced hot air. Commercial and industrial applications are pictured, and specification and dimensional data included. Edwin L. Wiegand Co.

416 For Heating Systems—A great deal of helpful information on heating systems is presented in Engineering Data Manual 2695, 28 pp. Detailed illustrated information pertaining to heating problems is given. Besides covering heating terminology, there are sections on steam data, water properties, piping data, weights and measures and pipe dimensions. Dunham-Bush, Inc.

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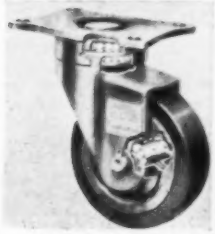

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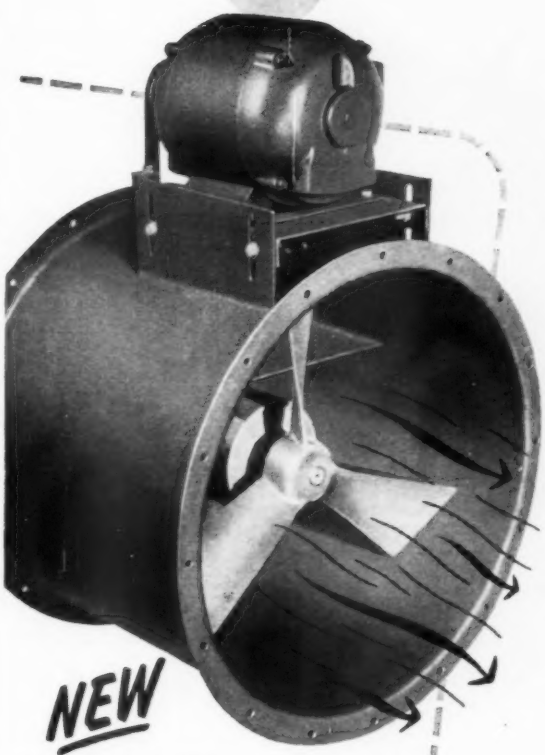

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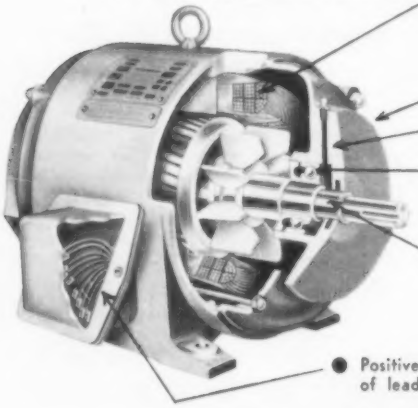

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DATA FILE

(Begins on page 224)

417 Plumbing, Heating Supplies — Edition H is the current edition of this company's 126-pp general catalog on plumbing and heating repair parts, tools and accessories. Indexed and illustrated, the catalog gives detailed information on sizes, intended uses. J. A. Sexauer Mfg. Co., Inc.

418 Stainless Steel Heaters — Complete description and specifications on stainless steel direct-fired heaters are included in 6-pp Bulletin F-57A-RO. Cutaway views, drawings and diagrams illustrating design and construction features are included. Reznor Mfg. Co.

BOILERS AND GENERATORS

419 Water Tube Package—Featured in this 20-pp bulletin are a package two-drum water walled steam generator for oil-gas-coal and a two-drum factory built or field erected steam generator for any firing method. Design and construction features are detailed and engineering data tabulated. Erie City Iron Works.

420 Decentralized Steam—Bulletin C-730 presents a case history showing how decentralized steam generation saved space, installation and operating costs at a manufacturing plant. Details briefly the function of each of six steam generators in providing for space and process heating. Clayton Mfg. Co.

INSULATION

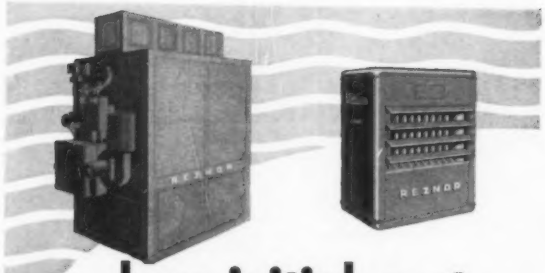
421 Glass Fiber Insulation — Among the company's products described in this illustrated bulletin are three kinds of flame-blown glass fiber insulations used for thermal and acoustical applications. Charts are included illustrating the acoustical and thermal values. L. O. F. Glass Fibers Co.

422 Insulation Specifications—This set of six specifications covers applications of Foamglas insulation for industrial equipment and piping. Each booklet contains tables of suggested thicknesses of insulation to be applied, drawings of installation procedure, supports, and recommended finishes. Booklets are devoted to low-, medium-, high-, and dual-temperature equipment and piping, to underground piping, and spheres. Pittsburgh Corning Corp.

MECHANICAL POWER TRANSMISSION

423 Dry Fluid Drive—Illustrated Bulletin A-665 describes the new fhp Flexidyne and coupling, announced as incorporating all advantages found in the larger sizes of this dry fluid drive. Includes tables listing motor and shaft sizes with which they may be used, also starting horsepower ratings for various speeds. Dodge Mfg. Corp.

424 On Drive Selections—Steps in selecting a heavy duty V-belt drive are outlined in 16-pp Bulletin DH-301. Service factor table, design horsepower



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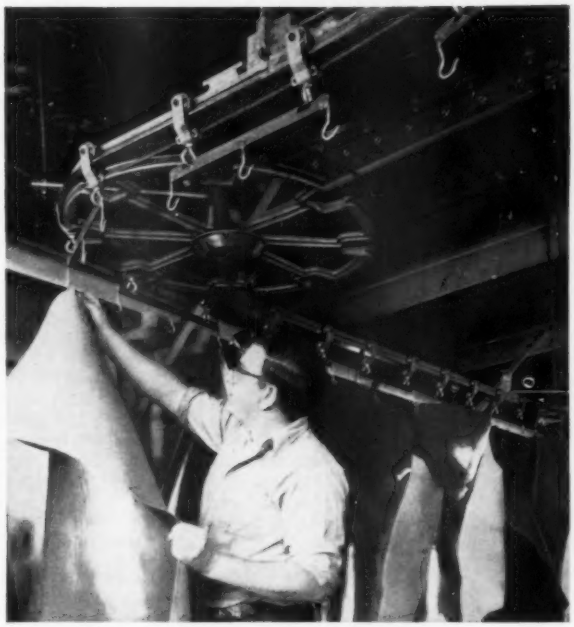

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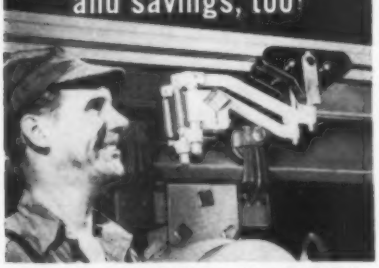

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(Begins on page 224)

table, minimum installation allowance table and complete selection tables are included. The Gates Rubber Co.

425 V-Belt Economy—Disadvantages of makeshift and other ill-advised means of coping with stretched or broken V-belts are discussed briefly in this folder. Answers questions on V-belt maintenance, inventory, wear. The Manheim Mfg. & Belting Co.

426 On V-Belts—Testing, inspection and control of V-belts is covered in this 16-pp booklet. Describes in words and pictures how raw materials and finished belts are tested and inspected. One section explains quality control procedures, and another section is concerned with experimental production. Goodyear Tire and Rubber Co.

427 Ball Bearing Trolley—Book 2536, 20 pp, describes a ball bearing trolley engineered for overhead conveyors. Features are shown on a large cutaway view and selection tables are included, as well as photos, dimensional diagrams. Link-Belt Co.

428 Shaft Mounting Drives—Bulletin 7100, 32 pp, describes all-steel, helical gear, shaft mounted drives for applications in the range from ½ to 50 hp and from 420 to 5 rpm output speed. Covers unit design and construction and provides suggestions on using the drives. Also given is information on how to select proper size and ratio of unit, sheave and belt. The Falk Corp.

On pages 219-220 are two postage-free Reader Service Cards provided for your convenience in ordering these catalogs. You may also use the cards to order any literature mentioned in ads.

429 Internally Geared Power—Featuring latest design improvements in gearmotors and embodying 60 multicolor illustrations, 16-pp Form F-1880 shows comparative advantages of gearmotors, lists ratings from ⅓ to 30 hp with gear ratios as high as 10:1. Cross-sectional details and enlargements of outstanding features are included. U. S. Electrical Motors Inc.

430 Flexible Couplings—Condensed Engineering Catalog 51-A contains excellent data on the choice and use of company's flexible metal couplings for power transmission. Tells advantages of these couplings and discusses design. Thomas Flexible Coupling Co.

431 Chains, Sprockets—Catalog 757, 68 pp, on company's stock roller chains and sprockets, stresses advantages gained through roller chain use, and pictures some typical roller chain drives. Tells how to select a stock roller chain drive. Provides specifications, ratings, prices and engineering data re-

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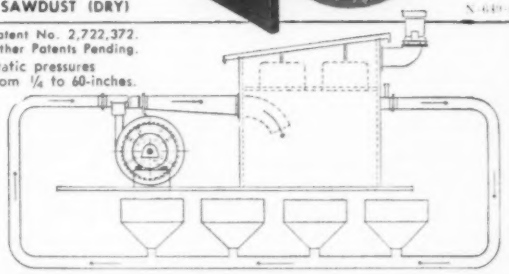

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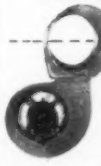

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(Begins on page 224)

quired for ordering. Book is generously illustrated with photos and drawings. Diamond Chain Co., Inc.

WATER TREATMENT

432 Products and Services—Bulletin GSP-901 24 pp, describes products and services of this company and its various divisions. These include ring balance instruments, components for control systems, electronic devices, force measuring devices, water and steam treatment, testing equipment. Hagan Chemicals & Controls, Inc.

433 De-Ionization Processes — Various types of de-ionization processes and equipment are featured in Bulletin B-157. Covers mixed bed de-ionization, twin-bed de-ionization, industrial softeners, filters of various types, aerators for gas removal, clarifiers for flocculation, standard package units, power package for boilers and process water. Illinois Water Treatment Co.

BENCHES, STANDS, SHELVES

434 Guide to Shelving — To assist plant engineers in selecting proper shelving for all storage requirements, 64-pp Catalog 30 offers detailed suggestions for correct shelving and storing materials, loose and packed parts, record files. Shop equipment and storage cabinets are also described, and instructions included for planning and building of stockrooms. Deluxe Metal Furniture Co. Royal Metal Mfg. Co.

436 Shop Equipment—Work benches, tool stands, shelving and other pressed steel equipment for the shop, laboratory and assembly line are shown in 8-pp Form 2299. Construction features and specifications of size, top material, equipment variations given. Standard Pressed Steel Co.

OTHER EQUIPMENT

437 Industrial Finishing Equipment—Catalog A 657, 12 pp, describes a complete modern finishing system for cleaning, rust proofing, drying, painting and finish baking. The R. C. Mahon Co.

438 Turbine Oil Conditioning—Bulletin 832-P, 12 pp, describes a dry type turbine oil conditioner designed to prevent action of air, heat, water, metals and foreign matter on turbine oil. Diagrams and text explain how turbine oil conditioning systems operate and tables list pertinent data. Bowser, Inc.

439 Fluid Power Circuits—The 28-pp revised edition of the "Circuit Rider" describes representative types of fluid power circuits and the possibilities afforded by their use. Circuits cover sequencing, semi-automatic and automatic cycling, dual pressure systems, safety systems, skip feed arrangements, and synchronization of two cylinders. Logansport Machine Co., Inc.

440 Water-Cooled Stoker—Design and operating advantages of the Vibragrate Stoker are outlined in this illustrated bulletin. A large cutaway view details component parts of the stoker. American Engineering Co.

441 Brinemaking Manual—Details on modern brine-making methods and equipment are presented in 12-pp Manual 135. Three types of brinemakers are described, as well as a wet salt storage system, and cutaway views are included. Morton Salt Co.

442 Classifying Systems — This bulletin covers major advantages, industrial applications and design features of high efficiency classifying systems for efficient separation or dedusting of dry powdered materials. Includes details on operation, flexibility of arrangement, power requirements, construction. Buell Engineering Co., Inc.

443 Protective Clothing — Catalog 12000, 12 pp, describes and illustrates company's line of industrial clothing for protection against water, fire, acids and alkalis, slipping and scuffing. Various types of work gloves, suits, and coats featured. The B. F. Goodrich Co.

444 Insect Control—Featuring manufacturer's insecticides and insect control equipment, this practical 36-pp booklet provides excellent tips on the control of industrial insects. More than 60 pests are pictured along with specific information on where they are found, identifying features, extent of damage, life stages and cycles, characteristics of existence, and recommended control measures. Ten insecticides are covered in detail. West Chemical Products, Inc.

446 Plastic-Cored Belt—Detailed information on company's plastic-cored belting is presented in two bulletins. One presents design and application data as well as selection tables, on Tanastic—a plastic-cored flat belt with chrome leather. The other bulletin covers Texalon—a combination of woven textile and flat ribbons of extruded nylon. J. E. Rhoads & Sons.

447 Blending System—The Airmerge system, a means of blending pulverized materials in a silo through quadrant aeration, is introduced in Bulletin B-1. Discusses a typical installation, development of the Airmerge, and principles of blending. An isometric drawing shows how dry materials are homogenized. Fuller Co.

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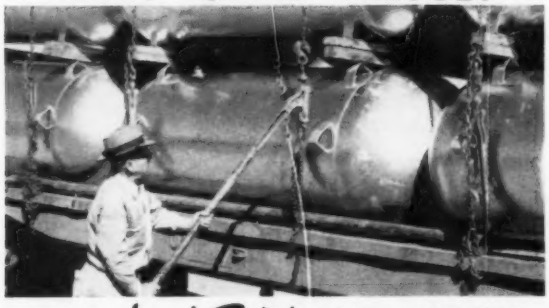

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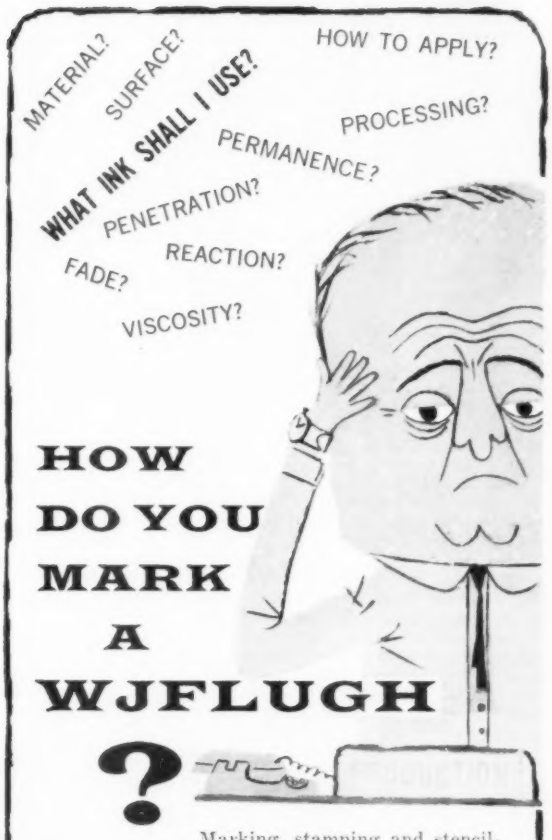

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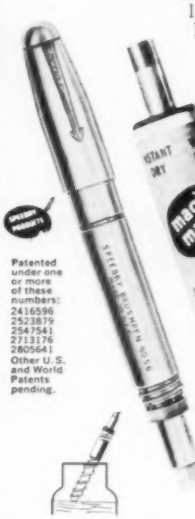

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DATA FILE

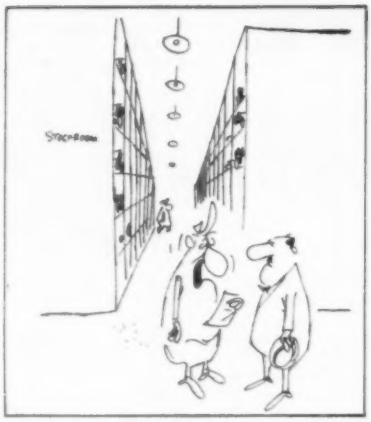
(Begins on page 224)

448 Preheating Combustion Air—This well-illustrated 36-pp booklet explains fuel savings and increased performance made possible by using waste heat in flue gases to preheat incoming combustion air. Also covers increased boiler output, ability to use lower grade fuels. Air Preheater Corp.

449 Standard Storage Tanks—The broad scope of services to which company's standard storage tanks are put is covered in this 20-pp catalog. Such qualities as versatility and economy are stressed and typical installations are pictured. Engineering standards given. Graver Tank & Mfg. Co., Inc.

450 Draft Starter—Capacity data for Quickdraft units are presented in 8-pp Form QF-SD. Seven capacity tables provide means for determining capacity of standard units when installed under hundreds of different conditions. Quickdraft Co.

451 Clad Plate—This 32-pp brochure describes manufacture of Hortonclad, a composite metal produced by a flux-free high strength bonding process which provides an integral and continuous bond between an alloy or special metal and its backing plate. Lists a variety of available cladding and backing metals. Also outlines research, design, fabrication and erection facilities available. Chicago Bridge & Iron Co.



". . . One of each??"

452 Permanent Magnet Pulleys—Bulletin 1021 describes a permanent magnet pulley for tramp iron separation in belt conveyor systems. Performance advantages are detailed and a selection chart is included. Stearns Magnetic Products.

453 Chemical Products—This 8-pp catalog describes company's production and maintenance chemicals, including sealing compounds, cements, oils and lubricants, hydraulic fluids, service products, and others. Table lists recommended sealants for specific applications. Permatex Co., Inc.

454 Special Blast Cleaning—Photos and schematic drawings are used in 34-pp Catalog 105-D to show how airless blast cleaning, air blast cleaning and wet blast cleaning has been employed in specific applications. Short case histories relate the experiences of more than 50 companies in solving special cleaning problems. Wheelabrator Corp.

455 Cooling Towers—Featured in 20-pp Catalog DFA-58 is company's double flow Aquatower, combining high efficiency with low silhouette. Specifications and engineering data are included, as well as dimensional drawings showing construction features of the cooling towers. The Marley Co.

456 Equipment Selector Charts—Bulletin CE-50, 20 pp contains selector charts on corrosion-resistant equipment for process industries. Tables cover general considerations in selection of material, physical properties, corrosion resistance, techniques and skill in manufacture of equipment. Describes rubber and plastic pipe, tubing and fittings; valves; pumps. Amerace Corp., American Hard Rubber Div.

457 Heat Exchangers—Bulletin GC-1054, 12 pp, describes features of company's heat exchanger with pumped boiler water circulation. Materials of construction are described and material specifications and operating pressures tabulated. Cost and performance advantages offered by use as instantaneous water heater, and as radiation heater are detailed. Bell & Gossett Co.

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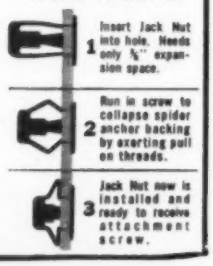
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2 Run in screw to collapse spider anchor backing by exerting pull on threads.
3 Jack Nut now is installed and ready to receive attachment screw.

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The easiest — and quickest — way to order bulletins and catalogs described in this magazine is to use the postage-free Reader Service Cards on pages 219-220.

All you need to do is circle the item numbers of those you want. Then fill in your name, job title, company name and address — and mail the card.

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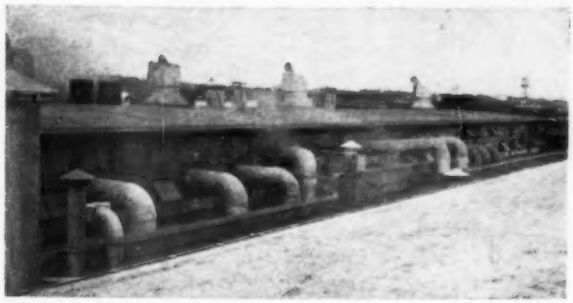
the downturn



and upturn at KVP

Same picture – different setting. Top shows complicated, space-wasting duct system which routed fumes back into plant for discharge through stacks. Bottom shows nine new 36" Aerovent "SP-7" Duct Fans installed to take fumes *up* and *out*, saving valuable floor space in busy working area. Just one of hundreds of successful Aerovent installations characterizing modern air engineering in action.

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All Aerovent Fans are rated in accordance with the Standard Test Code and U.S.D.C. Comm. Std. CS178-51.

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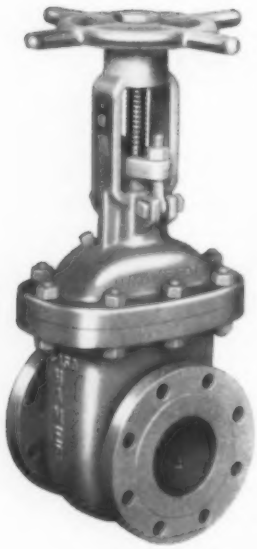
Hamer "Wedge Seal"

LEAKPROOF GATE VALVE

- *"Dual" Leakproof Sealing Action*
- *Positive Shutoff Upstream — Downstream*
- *Serviceable in the Line*



The new Hamer *Wedge-Seal*, unlike conventional Gates, incorporates a two-way sealing action that insures absolute line shut-off even on lines handling customarily hard-to-hold fluids. As the wedge is lowered to its precision metal-to-metal fit, a Teflon* seal in each side of the wedge compresses against the seats, forming a dual bubble-tight sealing action. Yet, with all of its added sealing quality, the new *Wedge-Seal* costs little more than a regular gate. Send for free literature today. See for yourself how a Hamer *Wedge-Seal* can actually pay for itself.

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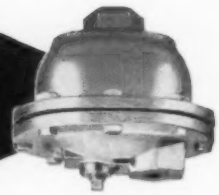

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- **Small, Compact**—Simple design, with a strong, cast semi-steel body.
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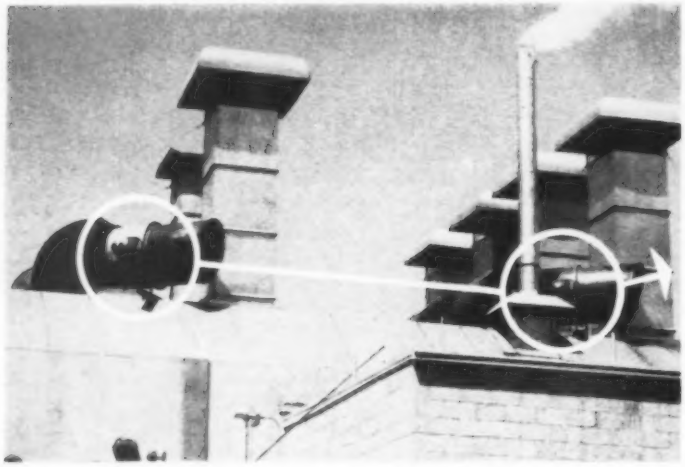
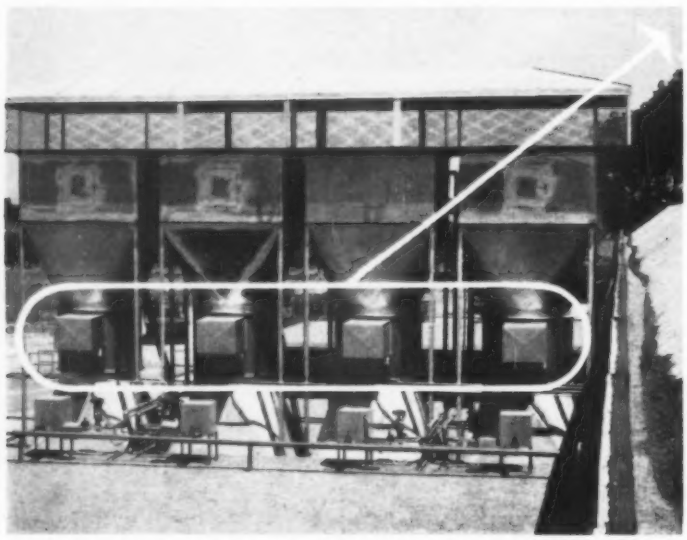
Hartzell belt-drive duct fans withstand heat and moisture

to keep production lines rolling at California Vegetable Concentrates, Inc.





The fan or blower which does an adequate job under routine operating conditions won't necessarily stand up when the going gets tough. Hartzell air moving equipment is designed and built with a plus capacity that allows it to take rough jobs in stride.

Typical of the unusual jobs which are a natural for Hartzell fans and blowers are these installations at California Vegetable Concentrates, Inc., Modesto, Cal. The top photo shows two of the five 44", 3 h.p. Hartzell belt-drive duct fans which exhaust 26,200 cfm of hot, wet air from a belt-type continuous vegetable dehydrator.

The lower photo shows four 48", 10 h.p. Hartzell belt-drive duct fans which supply heated air for a tunnel-type dryer. Each of these fans moves 30,800 cfm thru a gas fired heater (shown at the top of the stack). These fans are exposed not only to the high temperature of the entering air but to extreme radiant heat from the burners themselves.

Fan failure here would cripple the entire operation, but the customer reports that in 15 months of operation these fans have required only a minimum of routine maintenance. No damage due to heat or moisture has yet been detected.

For specific recommendations on how rugged, reliable Hartzell fans and blowers can help you solve your air moving problems, get in touch with your nearby Hartzell field engineer. If you don't know him, drop us a line for his name and address.

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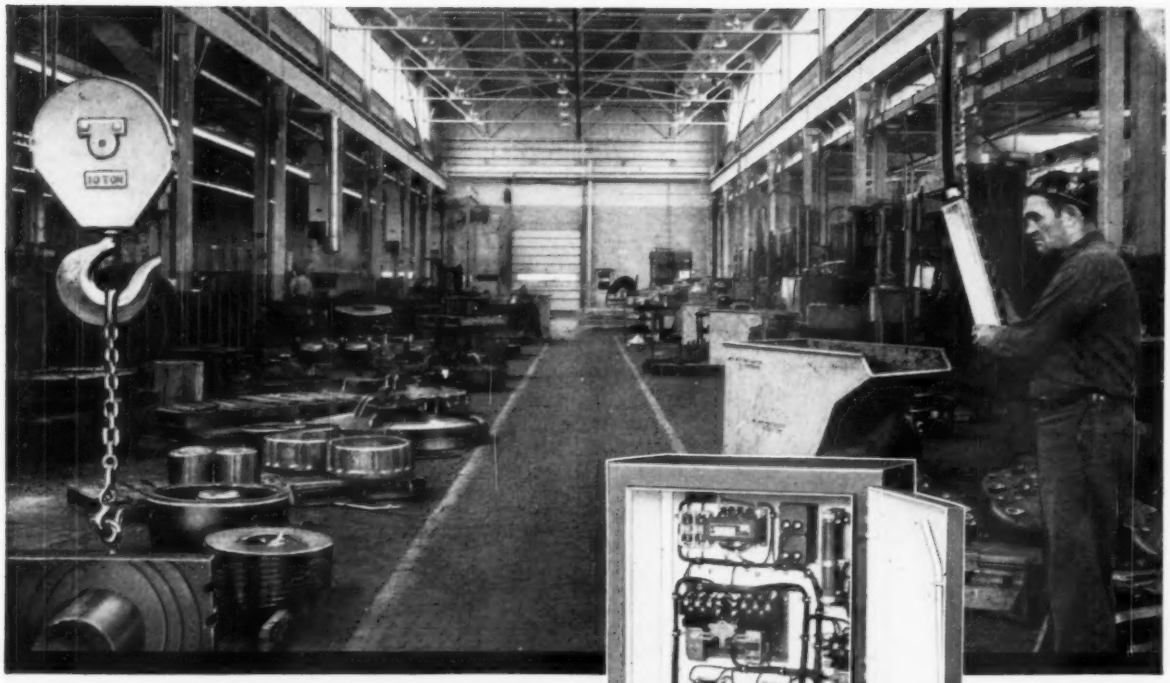
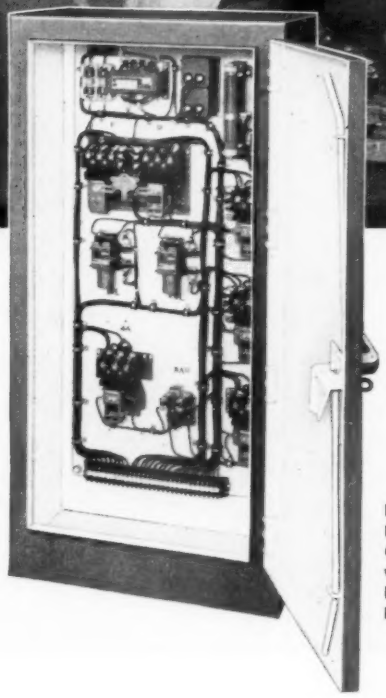


new

EC&M

"VL" AC CRANE CONTROL

for light industrial* crane service



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• Designed specifically for light industrial AC cranes, EC&M's full magnetic "VL" control assures smoother, more efficient operation than manual control. On cab-operated cranes, operators have greater freedom of movement with small masters mounted up-front and controllers at rear of cab. "VL" control is also available for cranes operated from floor by pendant push-button master.

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**NEMA Service Classification II applications*

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DECEMBER, 1958

Plant Engineering

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